bachmann.

Maritime Sector Automation

Shipbuilding. Offshore. Ports.

energy.industry.**maritime.**

Bachmann keeps you on Course

We deliver technology to automate the offshore and shipbuilding sector

Bachmann electronic offers customers worldwide in the marine and offshore sector sophisticated automation technology. All our activities are focused on the benefit of our customers: We deliver tailored hardware solutions and are guided by the highest standards. Meeting specialized market and customer requirements has long become a standard task for us.

The Future of your Maritime and Offshore Plant

Everything is under control with Bachmann system solutions

Our broad and modular product range meets really every customer requirement. We provide you with a homogeneous and comprehensive system solution that also ensures a high level of availability and long-term capability. We offer you everything from a single source and at the highest quality.

- Complete ships and offshore plants automated with up to 20,000 I/Os automated

- A system availability over 99.97 % confirmed by customers

Maritime & Offshore Essentials

- Perfect engineering tools
- Certified
- Impressive redundancy
- Maintenance through integrated CBM
- Integrated power management
- Open communication with all standards

For the maximum availability and efficiency of your ships and offshore plants

Redundancy

- Scalable with standard components
- Network redundancy with warm standby / hot standby
- Maximum availability
- Integrated diagnostics
- Bumpless switchover within one cycle
- Affordable
- Technologically tested

To ensure an optimum power supply

Integrated automation

- One tool
- One hardware
- Open & flexible
- Web-based

The right solution for every requirement

Condition Monitoring

- Over 15 years of CMS expertise
- Over 6,000 CMS installed worldwide
- The world's first GL certification of a PLC-integrated CMS
- Individual retrofit solutions made to measure

Because a weather forecast on its own is not enough

Power Management

- Fully integrated solution
- Easily scalable
- Individually adaptable templates
- Measuring, protecting and synchronizing
- Responding in milliseconds

For developing highly innovative solutions using our templates

The Future in View

*Our automation solutions set new standards –
worldwide and around the clock*

With an innovative mindset driven by years of experience and a passion for knowledge, we focus our attention on four areas:

b.control

Automation: Scalable. Robust. Versatile.

Thinking further, always keeping one step ahead, staying open for everything that the future will bring – this is our mission at Bachmann and what makes our automation solutions so special. A holistic system, perfectly tailored to the individual requirements of our customers – today and in the future. The core of every Bachmann system solution is the M1 automation system: a modular hardware and software concept that guarantees maximum availability, future investment security and engineering efficiency.

b.grid

Grid Measurement, Protection and Control: Safe. Fast. Stable.

A scalable range of integrable, multifunctional power meters are available as plug-in modules for the M1 automation system. The measurement of all characteristic grid variables such as voltage, current, power or frequency directly within the control system allows significant correlation with other operational data, as well as an excellent reaction time. The measured data is rapidly calculated without additional delays due to fieldbusses or transceivers.

b.operate

Visualization and Operating:
Visualize. Web compliant. Versatile.

In the automation industry, approaches such as Industry 4.0 and the associated breakdown of the rigid automation pyramid are widely discussed but rarely followed through. Unfortunately, solutions closely following this rigid principle are still frequently found in the field. The visualization solutions from Bachmann take a different approach. To advance the digitization in automation, our solutions focus on flexibility and freedom.

b.guard

Condition Monitoring System:
Planning. Detecting. Preventing.

A Condition Monitoring System (CMS) integrated in the automation system can provide all information, in order to detect failure hazards early on and plan maintenance tasks in good time. With increasingly competitive markets and industries, companies are challenged to run their organizations with ever more output and greater efficiency. Knowing the health of assets has become key to increasing company productivity and profit.
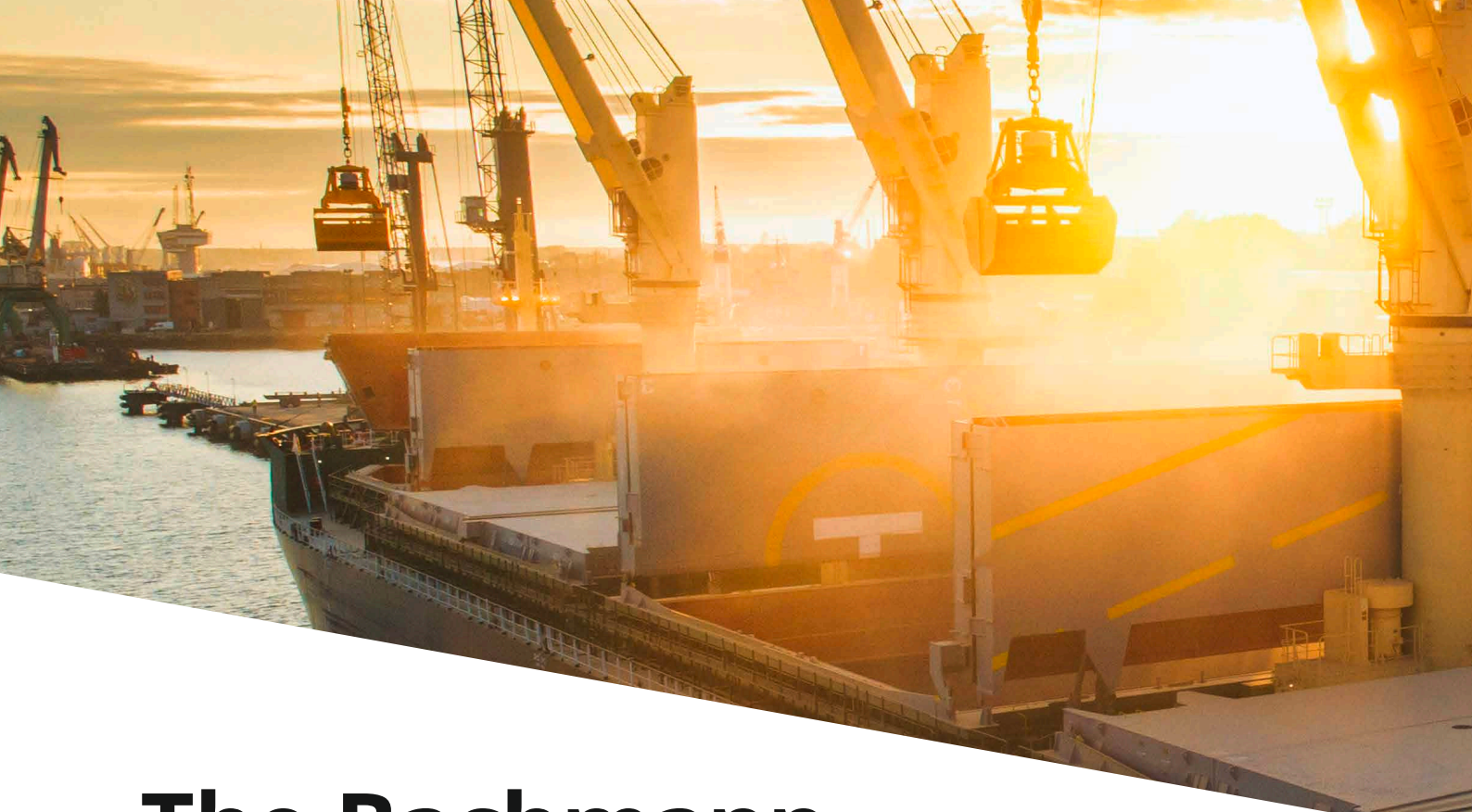
The Bachmann System

The automation technology for maritime and offshore

We understand the big picture and are always thinking ahead for you. Our innovative solutions ensure efficient engineering of your plants. This is what the intelligent automation of state-of-the-art maritime and offshore plants looks like.

Top Technology without Limits

── *Automation*

Automate your offshore plant with Bachmann, secure in the knowledge that every eventuality is covered. Our innovative automation systems stand out on account of their extraordinary robustness, high performance and open interfaces.

❄ **ColdClimate**
–40 to 70 °C

Openness in hardware and software

The M1 system operates as a real-time system. Different open-loop and closed-loop control programs are adapted in modules and run simultaneously in a preemptive multi-tasking environment. Like the hardware, the software system is also modular and can be structured and extended as required following our "no limits" principle. The controller offers additional reserves for expansions or plant-specific modifications.

Functionality means "ready-to-use"

The modular M1 system offers an extensive range of hardware, consisting of over 200 devices and modules. This system contains a large number of configurable modules for all necessary plant functions, such as visualization, networking, closed-loop control and diagnostics, to provide you with all the basic functions from the start. We place great importance in ensuring that all tools are developed according to international standards, and can also be integrated and parameterized flexibly.
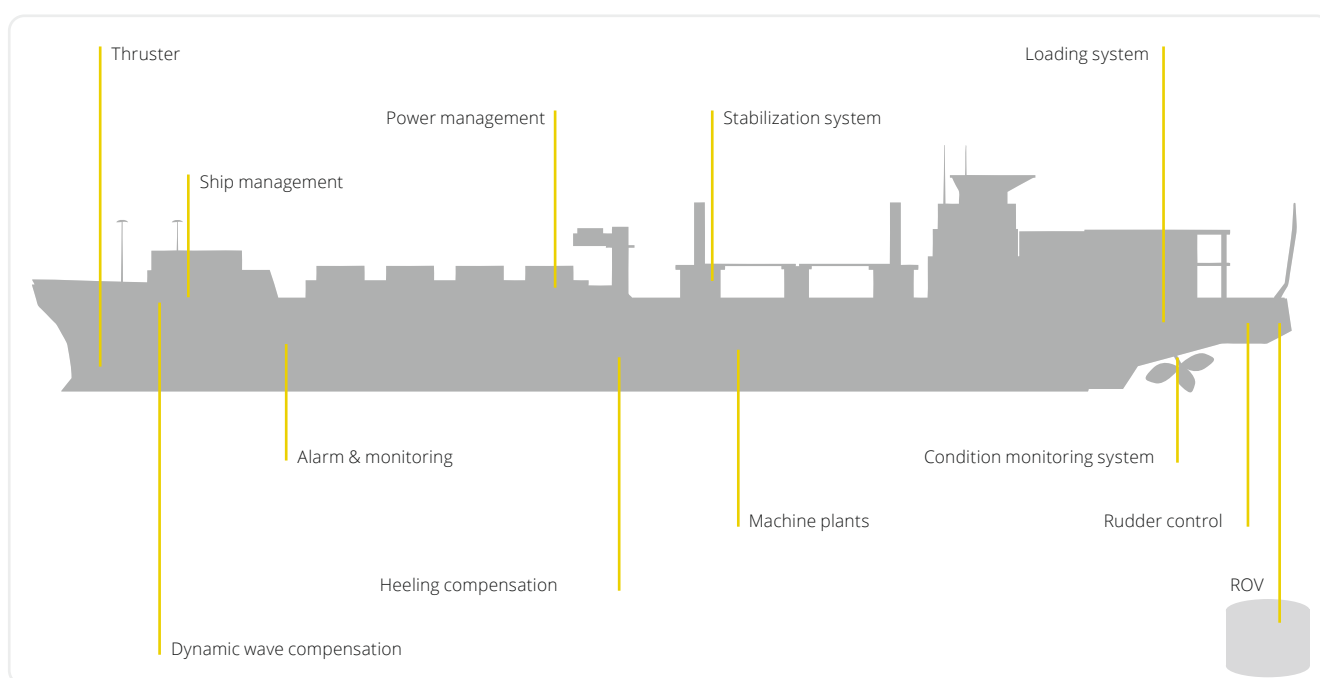
Equipped for challenging climates

The ColdClimate modules of Bachmann electronic are the solution for all applications in demanding climatic conditions, especially where maximum plant availability is critical. The Cold-Climate modules are first choice, especially when demanding environmental conditions (e.g. temperature, air humidity, salt spray) are involved. For you this means: Safe operation, even with extreme transient temperatures from -40 to +70 °C, and reliable continuous operation guaranteed in the temperature range from -30 to +60 °C with condensation.

System Concept: Scalable and open

In order to minimize complexity and maximize ease of maintenance, all components of the M1 controller system are consistently developed as part of a modular system. In this way, optimum scalability is ensured for a wide range of requirements. The M1 system perfectly combines the openness of a PC-based controller with the reliability of industrial hardware platforms. A state-of-the-art system architecture designed for effective networking capability enables it to be integrated easily in the area of the controller and plant peripherals.

▼ Regardless of the type of ship or offshore and marine application involved: We offer you products for tailored solutions. Meeting highly specialized requirements has long become a standard task for us.

Thruster

Loading system

Power management

Stabilization system

Ship management

Alarm & monitoring

Condition monitoring system

Machine plants

Rudder control

Heeling compensation

ROV

Dynamic wave compensation

Certified systems

Internationally accredited test institutes verify the conformity of our Bachmann systems with the most important global standards and thus provide approval for the most demanding applications.

Virtual Commissioning of Ships through HIL-Simulation

Model-based Design

Simulation is an issue that virtually all machine and plant builders have to consider. The absence of ways to implement a straightforward simulation has up to now prevented it from being included in the development process. However, companies that do explore this approach are able to solve tasks that were previously just a remote possibility. Bachmann's technology gives machine and plant builders the possibility to simulate small tasks right through to complex ones.

The challenges placed on the automation in offshore applications and on ships in particular are constantly increasing. The increasing size of plants and the introduction of new technologies have also increased the complexity of operational control programs. New development techniques for creating these programs are needed in order to minimize the development effort required on the one hand, and to bring out technically mature and highly available plants on the other. This is where the benefits of simulation for the virtual commissioning of ships and offshore plants are clear to see.

Control task

A ship control system consists of software programs for the individual plants. Input signals, such as commands, positions, pressures or temperatures are read, processed and output to actuators such as motors, pumps or valves. These programs can be simple but also increase in complexity the greater the level of automation required.

Hardware-in-the-loop (HIL) simulation

Bachmann M1 controller can process the control and simulation software at the same time. Developers can carry out function tests on subsystems right through to complete installations from their desktop.

Cost efficiency

"Getting to market faster with the better solution" – this is the basic paradigm of our global economy. The many programming options of the Bachmann M1 automation system help here. Calculable investments that are also inexpensive compared to their benefits pay for themselves quickly. The customer-friendly license model of M-Target for Simulink® does
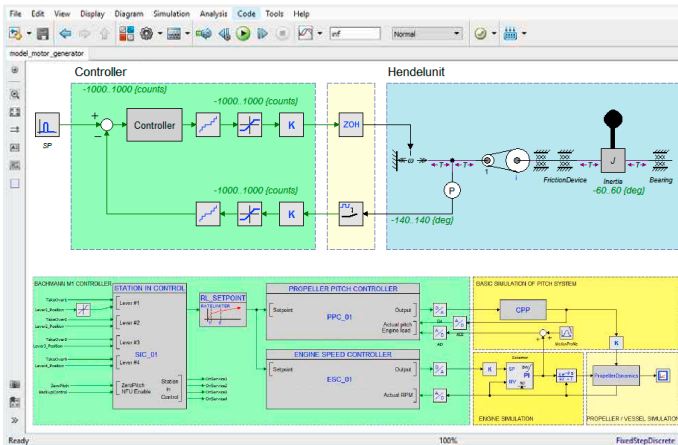
Simulation: Solution development on the computer model and direct download to the M1 controller.

not involve any unit-based purchase of licenses and thus has no negative effect on product profitability. 20-sim can be purchased directly from the manufacturer and has the M1 already integrated as a target.

Shorter commissioning times

Any errors that occur are restricted to the wiring. The onsite commissioning of ships and plants starts with a tested software and visualization, thus considerably reducing the costly commissioning time required. Development engineers are hardly required on the installation site any more, thus considerably reducing costs for commissioning and travelling. Planning and keeping to schedules become easier. Dangerous situations for people and machinery on ships can also be prevented.

Best features of the M1

Thanks to its outstanding features, the Bachmann M1 controller enables the simulation to be run simultaneously with the plant program on the same controller. Even 'smaller' tasks can now be tested easily by simulation, thus making it possible to achieve a high standard in the quality of the software.

The Simulation Steps

1. Manual test
The individual functions of the plants are tested manually by means of test lists via the visualization.

2. Function simulation
Simple simulations in which the runtime program is tested can be created with the PLC development tool according to IEC 61131.

2.1 Model-based simulation
This simulates the process features and the plant behavior. During the development of a software more process knowledge is required in order to increase its quality. The development tools used mostly consist of higher-level programming languages such as C/C++. Model-based development environments such as MATLAB® / Simulink® and 20-sim are used for very complex tasks or dynamic simulations. Libraries which emulate or simulate mechanical processes are provided in model-based development environments.

3. Determining the remaining lifespan
The results of the remaining lifespan calculation which determines the maintenance intervals can also be tested with the simulation. These can be used as a basis for a CMS expansion.

4. Code generation
The automatic code generation further increases the quality of the software as the process once tested always runs immediately. The simulation program can be generated from the same measuring point list and thus prevent transmission errors.

5. Automatic test
The visualization is operated by a test sequencer which automatically processes the functions of the test list. This enables all functions to be reproduced. The result is stored in a test log.

All-in-one Engineering

SolutionCenter

The Bachmann SolutionCenter represents a genuine milestone in the reduction of engineering costs. All areas of the engineering process are covered as part of a single complete software solution: configuration, programming, control, motion control, communication, safety, visualization, as well as testing and commissioning.

## SolutionCenter – All-in-one engineering tool

The SolutionCenter supports all aspects of the engineering for marine applications and perfectly integrates with Bachmann devices and systems. It was designed in collaboration with experienced users and allows effective engineering in all phases. Through the plugin concept, the SolutionCenter enables necessary functions or user-specific requirements to be added at any time. This can be done either by selecting a third-party plugin from the extensive offering or with in-house developments.

Component Manager

More than ever, modern marine plants consist of complex mechatronic systems which can only be implemented through the close collaboration of all the engineering sciences required for the process. This complexity is handled by breaking down the plant into logical function units also known as components. Bachmann's Component Manager is designed for this task. The tool allows you to form systems from different components, which are represented as software modules. Components can not only be created in the optimum programming language for

▼ **Component Manager:** Clear application display in the SolutionCenter.
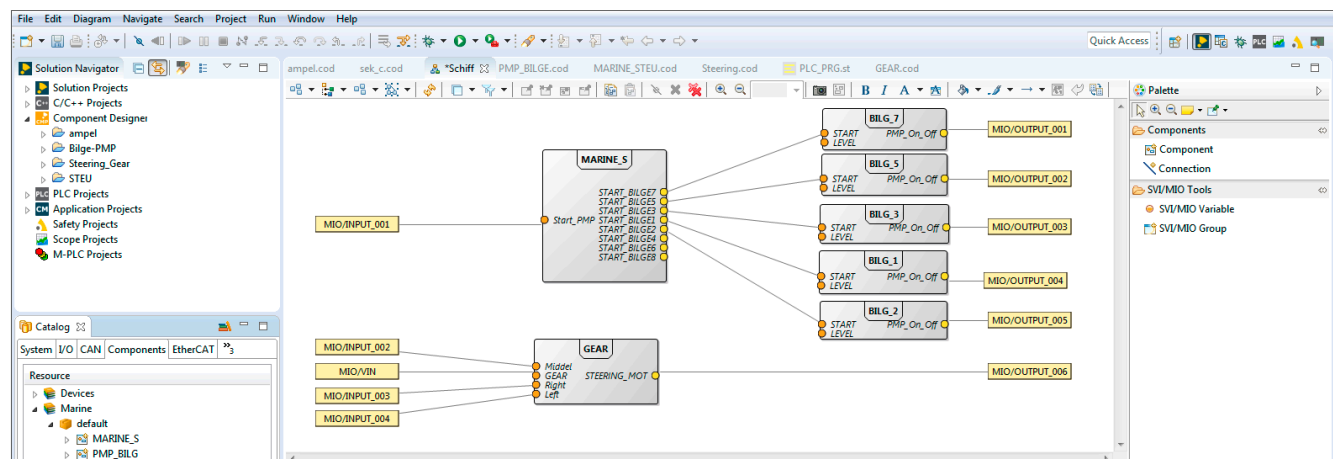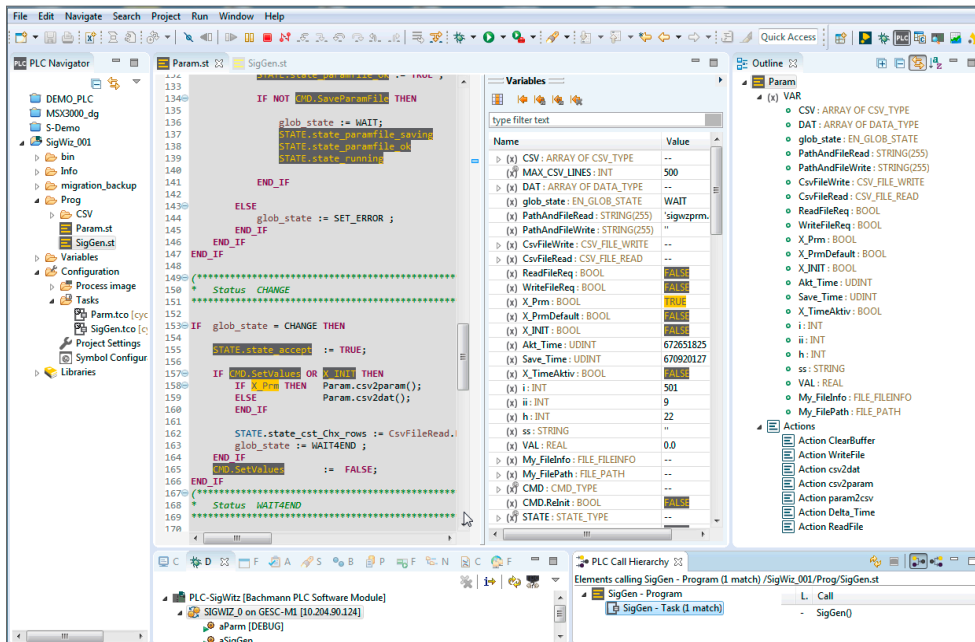
PLC Developer: Modern editor for IEC 61131-ST fully integrated in the SolutionCenter.

your task but also purchased and reused. This makes it possible to add new custom variants, product versions or new functions (different software module combinations, additional modules,...) without modifying the existing software. This methodology makes use of modern tools to support the engineering process. Through the plugin concept, SolutionCenter makes it possible to use all common versioning systems (SVN, GIT,...) and thus manage the entire history of the project with all its components.

Programming tools

SolutionCenter provides modern programming environments for creating the software modules. Automation tasks and requirements can be addressed both with the new PLC Developer tool from Bachmann as well as with the proven M-PLC Tool in IEC 61131. Programming in C/C++ at the same time in the form of autonomous modules or as libraries for the PLC environment is also possible. Simulations and closed-loop control tasks can be modeled and simulated with MATLAB® / Simulink®.
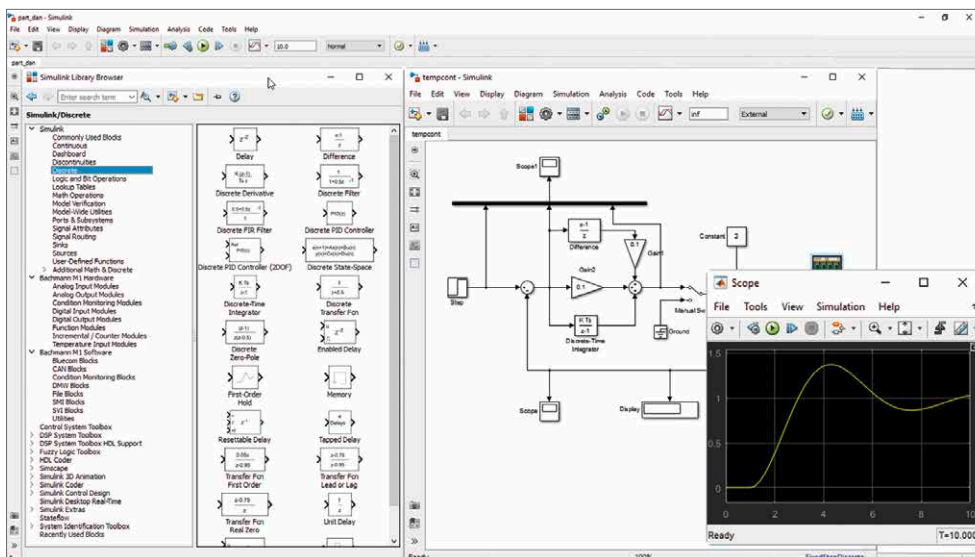
MATLAB® / Simulink®: Development of open and closed-loop control programs for the M1 using the M-Target Toolbox.
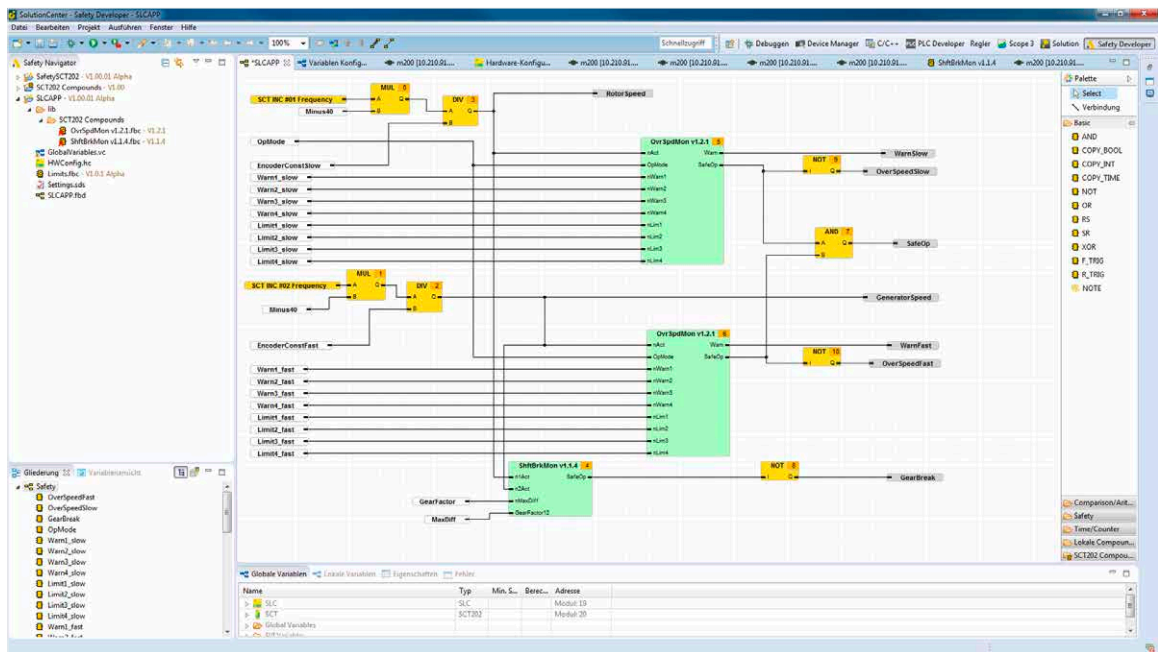
▼ **Seamless integration:** The complete integration in the SolutionCenter reduces the time required for the configuration and reduces downtimes, thanks to the simple remote diagnostics and onsite troubleshooting.

The M-Target Toolbox and interface developed by Bachmann ensures perfect integration with the M1 automation target system. Extensive libraries are available in any programming language for a variety of tasks.

Test/quality/simulation

Quality assurance tests must be carried out during and after software development. Solution-Center supports the programmer while performing extensive software test procedures (unit test, static code analysis …) as well as when testing the application software. The component-oriented design of the application program enables targeted-testing. Software can be tested as a complete application or as individual software modules. For these tasks, processes based on CSV tables, as well as extensive processes such as hardware-in-the-loop (HIL) are available.

Security/safety

Plants in the energy sector must comply with stringent security and safety standards. This involves both the area of unauthorized access to the controller as well safety shutdowns in dangerous conditions. SolutionCenter allows the configuration of extensive security features and provides the Safety Editor – a user-friendly CFC Editor for programming the safety controller integrated in the M1 system. A wide range of libraries are available for the rapid implementation of the safety application. This includes the exchange of variables with the operational control program.

Communication

Modern plants are no longer possible today without the implementation of a network. The M1 controller supports all commonly available networks, fieldbuses and protocols, such as

Ethernet TCP/IP, PROFINET, EtherCAT, CAN bus or Modbus, IEC 61400-25, IEC 60870-5-104 or OPC UA. The configurators required are also included as well as diagnostic and testing tools.

Visualization

The increasing complexity and constantly rising level of automation in different plants require the use of HMI and SCADA systems that support both very small applications, with only a few dozen information items as well as large-scale plants, with around 100,000 process variables. It must be possible to adapt visualizations quickly and effectively to the requirements of the application to support these requirements. SolutionCenter provides solutions for this based on standard technologies (OPC UA, HTML5 …).

Diagnostics

In all engineering phases, the SolutionCenter offers an interface to all the information about the plant. With dynamic processes, the display of physical variables as a numerical value is not enough. The Scope 3 software oscilloscope enables automatic long-term archiving (logging) as well as the automatic recording of sporadically occurring events in relation to other process variables. The acquired data can be archived in a database for subsequent processing. Scope 3 is fully integrated in the SolutionCenter. This enables, for example, Scope recording configurations to be assigned to a project and kept in the integrated version manager.

Operational control

During the operating phase, SolutionCenter provides support with a clearly arranged display of all ships. The actual operating state as well as all the necessary parameters are clearly shown. SolutionCenter provides all turbine data and information required for the operation of the plant.

▼ **Fast commissioning, lower service cost:** Using Scope 3 to make the plant transparent quickly and down to the microsecond range.

BRIDGE

- Alarm & monitoring
- Configuration
- Information management
- Remote diagnostics
- Teleservice
- Simulation
- Cruise control
- Maneuvering controls
- Automatic track keeping
- Autopilot

CABIN

- Alarm & monitoring
- Extended alarm system
- Information system

DECK

- Active heave compensation
- Cranes
- Winches
- Gangways
-
- Cable drums
- Trenchers
- ROV
- A frames

MACHINE CONTROL ROOM

- Alarm & monitoring
- Dynamic positioning
- Energy management
- Drive control
- Rudder control
- Ship automation general
- Diesel electric drive control
- Transient recorder

MACHINE/CARGO ROOM

- Anchor & winch control
- Ballast compensation control
- Condition monitoring
- Motor control
- Fuel conditioning
- Process control
- Water treatment

Network 2

Network 1

2nd Master CPU (optional)

Connection to I/O stations

CANopen

MODBUS / NMEA / SAE J1939

PROFIBUS

FASTBUS

Connection to I/O stations
or third-party system

CANopen

MODBUS / NMEA / SAE J1939

PROFIBUS

FASTBUS

bachmann.
AutomationSystem

bachmann.
SolutionCenter

Condition
Monitoring System

Maritime & Offshore
Template

Power
Management

Redundancy

Model Based
Design

Safety

ColdClimate
–40 to 70 °C

SCADA
webMI

Bump-less backup in case of failure

Redundancy Control

Bachmann automation solutions stand out on account of their highly robust design and maximum availability. Nevertheless, no single system can guarantee complete freedom from failure on its own. The use of a redundancy system enables you to increase the availability of your installation or ship effectively and sustainably.

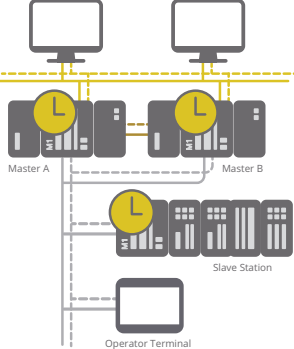Malfunctions and failures in important operating components reduce the uptimes of machines and plants. In addition to this, they often lead to consequential damage and lengthy repairs. This involves considerable costs, and the production downtime leads to financial losses. Redundancy systems increase the capabilities of automation systems through the feature of single fault tolerance. This makes it possible to ensure continuous productivity – even while maintenance or modifications are being carried out on the plant – 24 hours a day, 7 days a week. Bachmann's redundancy solutions enable you to

increase the availability of your plant effectively and sustainably: System variants that are tailored to meet any particular requirement enable you to optimize productivity and operational reliability. The seamless embedding in the proven hardware, engineering and programming concept already in place, together with the robustness of tried and tested Bachmann components, guarantee the highest level of operational reliability, thus maximizing yield. This optimum combination not only guarantees single fault tolerance throughout but also multiple fault tolerance in many cases.
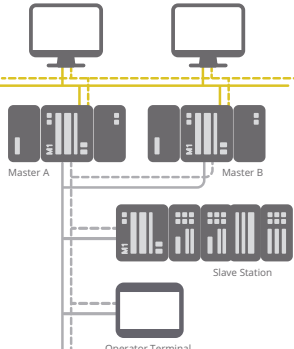
Integrated network diagnostics makes the actual status available at a glance.
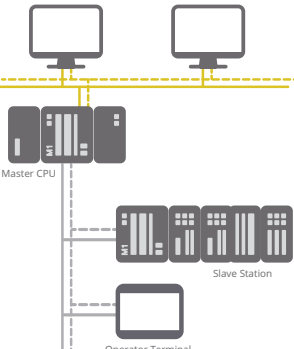
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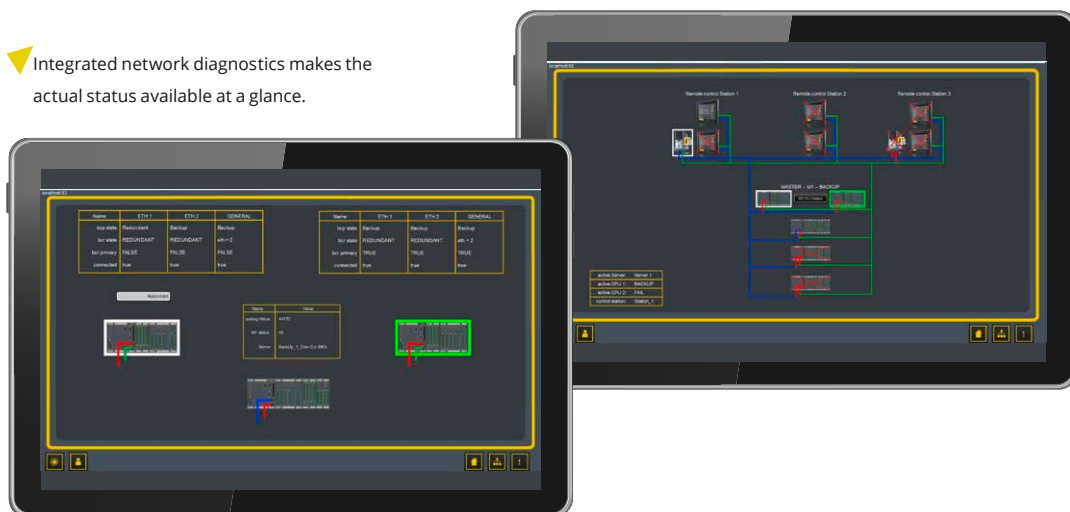
HOT STANDBY REDUNDANCY

- *Network redundancy included*
- *Two master CPUs*
- *Automatic synchronization of master CPUs*
- *Bumpless switchover*
- *Redundancy cycles up to 1 ms possible*
- *Automatic switchover between variables and process value sources within one PLC cycle*
- *Time synchronization of all stations*
- *Configuration and monitoring in the SolutionCenter*
- *Enhanced diagnostic and programming interfaces for monitoring and evaluating the redundancy status*
- *Freely adjustable switchover time, automatic switchover in the event of a fault*

WARM STANDBY REDUNDANCY

- *Network redundancy included*
- *Two master CPUs*
- *Diagnostic interface for monitoring and evaluating the redundancy status*
- *Slaves decide the CPU from which the data packet is to be used (voter)*
- *Configurable switchover time*
- *Synchronization of master CPUs not integrated*

NETWORK REDUNDANCY

- *One master CPU*
- *Redundant communication (cyclical and acyclical)*
- *Fully autonomous, double communication guarantees optimum reliability for any selected transmission medium (copper/fiber optic)*
- *Redundant Ethernet-based networking, full support of TCP/IP-based parallel communication*
- *Freely selectable network topology: Radial, linear, ring and combinations*
- *Simple configuration in development environment, integrated diagnostics (status, quality)*
- *Programming interface, libraries and system variables for easy creation of applications*
- *Network switchover in the same PLC cycle*

Short switchover times

The switchover time is a quality feature of a network redundant system. Typical systems often operate using a ring topology. In the event of a failure the network devices reroute the data packets. However, the detection of a fault and the subsequent switching takes time. The redundancy solutions from Bachmann directly integrate the detection and switchover operation in the communication end points. This approach allows considerably better switchover times, and any topology can be selected thanks to the comprehensive Ethernet conformity.

Fault detection integrated in the end points

Another benefit of the integration is the voting mechanism used by all Bachmann terminal devices. After being configured once in the application program, redundant process variables here can be used and processed as a single variable without having to manually read or write the values twice. Management and fault detection are completely handled by the system, thus reducing the workload for the user.

Scalable and cost efficient

With Bachmann systems, redundancy can be tailored to meet the requirements at hand. The use of standard components offers a wide choice of powerful CPUs which can communicate with the substations either via copper or fiber optic connections. Combined with the product variants, this results in the most economical solutions – from simple network redundancy to protection from communication failures, right through to the virtually fully available system.

Grid Measurement at the Highest Level

Power Management

Initiatives such as the All Electric Ship (AES) require the increasing stability and controllability of shipboard energy grids. Capacity bottlenecks must always be prevented and the ship's engines must always have power available. The coordination of grid protection, the hard real-time monitoring of loads, and the fast and targeted supply of electrical energy are fundamental requirements here.

Fully integrated and still easily scalable

Several technology modules are available for the power management alone. The GSP274 module makes Bachmann's experience in the automation of decentralized energy generation units available for maritime applications. It ensures the safe, reliable and automated synchronization of generators to the ship's power grid. For this the module measures the grid at three points and actuates two circuit-breakers via a relay output, taking the switch delay into account. The GMP232 grid measurement and protection module from Bachmann integrates the protection and monitoring functions in the "conventional" control tasks. The third module GM260 can be used for measuring the grid. Software modules with standard and easy to operate interfaces round off the package.

Maritime power supply

A central power management control unit enables you to implement advanced real-time power management solutions with remote technology modules connected by fiber optic cables. This ensures that the coordination between the power generation units and the dynamically changing load demands is straightforward and reliable.

Tasks of the power management system

The system must ensure that sufficient load reserves are always available at the busbar. In order to do this, generators are automatically started and synchronized, and loads with a low priority disconnected. To detect faults with a high level of accuracy, the GMP232 and GSP274 are equipped with an integrated data recorder. This enables up to 16 measuring channels to be recorded with precise synchronization for four seconds at a maximum resolution of 100 μs. The recording can be triggered remotely or activated in the event that predefined limit values are exceeded. The measuring data is then available in

the SolutionCenter or as an exportable file in the Comtrade format. In the event of a fault, this makes it possible to safely and reliably reconstruct the causes without any additional effort.

High performance PLC

To handle all these tasks, the M1 marine automation system comes with a high performance processing unit and offers high speed and reliable networking options at the same time. The M1 automation system allows a high degree of flexibility whilst still ensuring a high level of functional integration at the same time. Development engineers can thus be certain that they can even implement non-standard tasks. Operating and maintenance personnel appreciate the safe and reliable diagnostic options for system events. The data can be fully integrated in the central alarm & monitoring system. This therefore reduces maintenance work and enables abnormal system loads to be detected early on before they can cause significant damage.
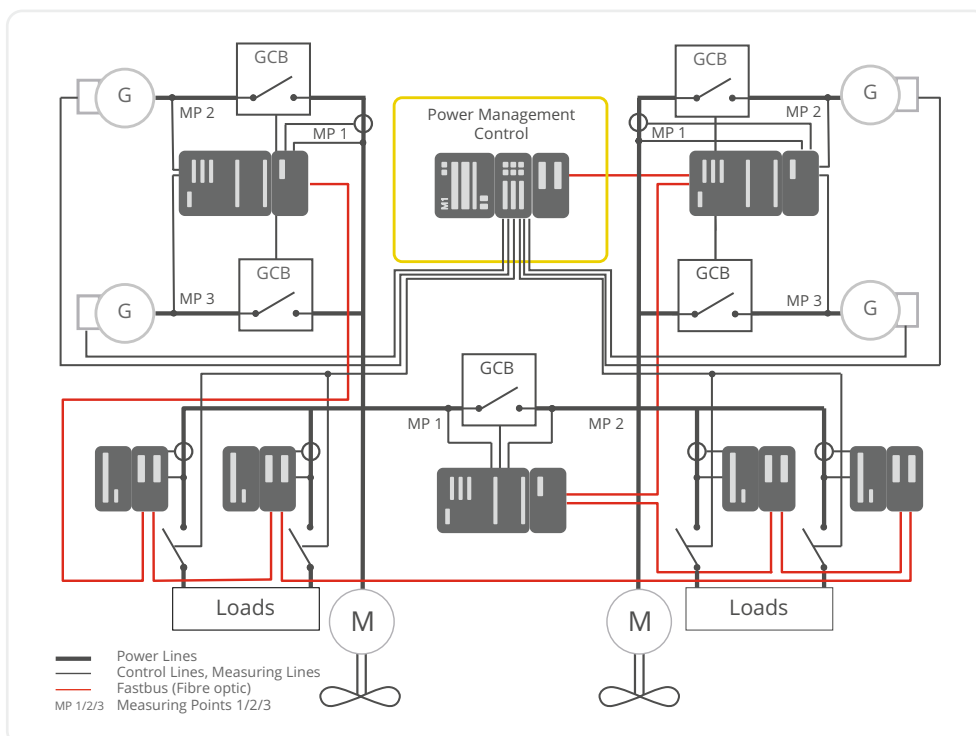
GSP274 FUNCTIONS

- *Grid measurement*

- *Grid voltage: 480 V*

- *Additional to the GMP232 module: 4 additional voltage inputs (total 7; GMP 3), 1 additional current input (total 4; GMP 3)*

- *Grid monitoring Additional to the GMP232 module – Q/V protection (reactive power/ undervoltage monitoring)*

- *Event lists*

- *Data recorder*

- *Synchronization: Monitoring of synchronization conditions*

- *Certification*

  VDE AR 4105: Grid and system protection; requires two-channel measuring and tripping; mandatory in Germany when connecting energy generation plants to the low-voltage grid

  Unit certificate FGW TR3: Simplifies the issuing of plant certificates. Plant certificates must be issued in Germany in order to obtain the "system services bonus" (= higher feed-in tariff).

▬▬	Power Lines
—	Control Lines, Measuring Lines
—	Fastbus (Fibre optic)
MP 1/2/3	Measuring Points 1/2/3

Hydraulic Valves
fully under Control

Proportional Valve Amplifier

Hydraulic systems are becoming increasingly more technically sophisticated with a growing need for the electronic control of their components. Hydraulic valve amplifiers normally control valves by means of pulse width modulation (PWM). This enables both the size of the amplifiers as well as their power dissipation to be reduced. The proportional valve amplifiers of the PVA200 series from Bachmann electronic are equipped with a state-of-the-art PWM output circuit with up to 8 channels for current regulated control. This integrated solution provides the user with a host of benefits: maximum output with a minimum size and minimum costs for commissioning and maintenance.
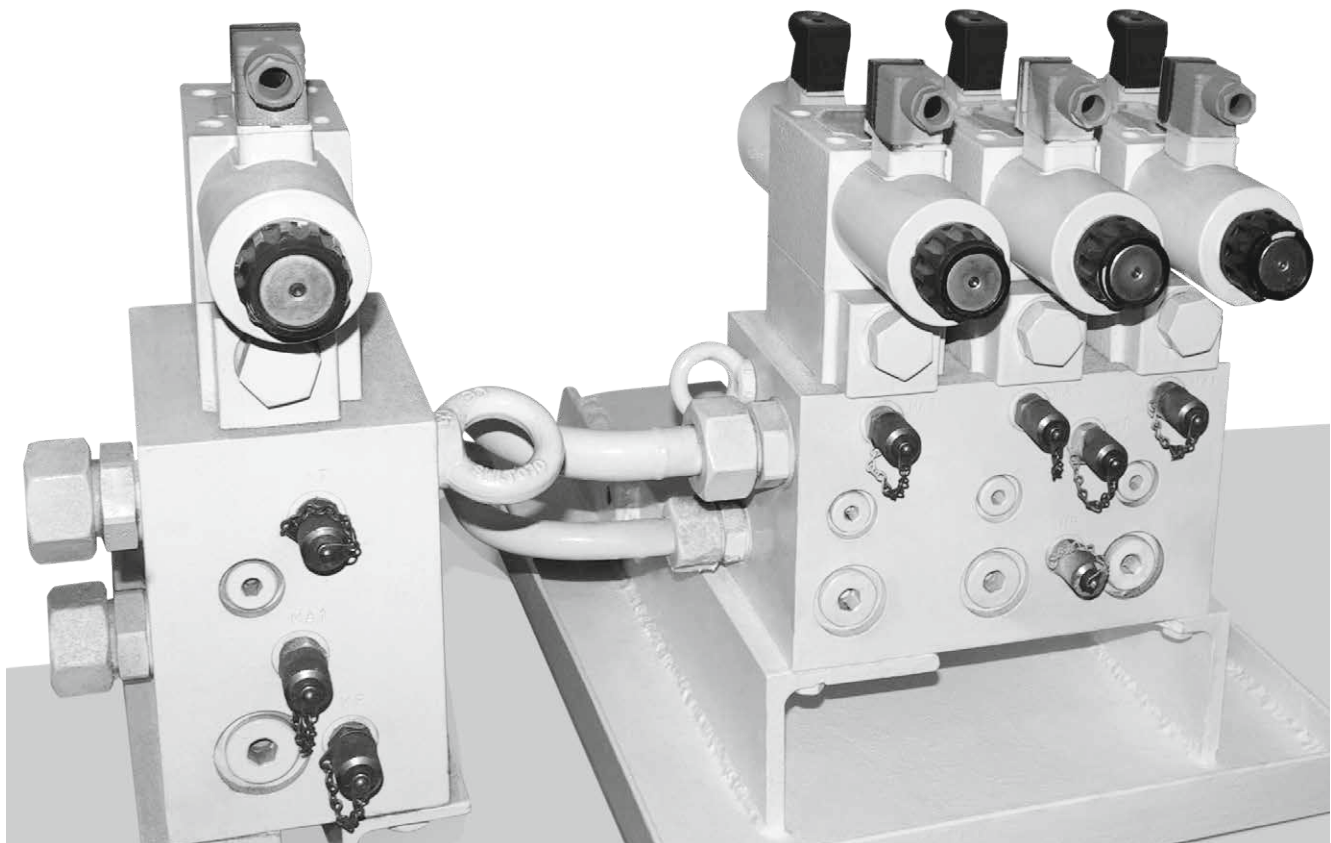
	PVA204	PVA208
Valve types	Unipolar coil, bipolar coil or valves with 2 coils	
Coils	4/2/2	8/4/4
Voltage	24 VDC (18 to 34 V)	
Coil current	2 A / 2,5 A / 2,5 A	1 A / 2 A / 2 A
Current-regulated	Yes, ±5mA accuracy	
Dither	Adjustable from 0 to 30 % in 0,1 % of INenn	
Dither frequency	40 to 500 Hz (in 5 Hz steps)	
PWM frequency	Fixed 50 kHz	
Coil supply voltage	24 VDC (18 to 34 V)	

The controller normally sends the appropriate control commands to the hydraulic valves. For an electromagnetic hydraulic valve it requires either a position control with two positions (open/closed) or a standard analog signal (0-20 mA) to define a setpoint for the amplifier. The direct connection of the valve coils to the PVA200 module of the controller is an alternative possibility. Its PWM output carries out the proportional position control directly. The current regulated by the PWM signal through the coils corresponds to the force that acts on the valve piston. This moves to the required position and thus regulates the required quantity of hydraulic oil. Using the PWM technology requires no adaptions to the valve coil: The piston moves proportionally to the current flow. Besides the efficient control of the current, it is also possible to overlay it with a dither, make corrections to the characteristics, or compensate the underlap and overlap, as well as limit the ramps and provide protection from short circuits.

Full control

The PVA200 modules are designed to control proportional valves with one coil, bipolar coils or two coils directly without an additional amplifier. With a mounting width of only 55 mm, the PVA208 module can thus control up to eight coils. The current regulated control automatically compensates the temperature of the coil resistance caused by self-heating or changes in oil temperature. The flow characteristics can also be linearized as required with a freely configurable curve with up to 20 interpolation points for each coil.

Problems solved

Stiction and hysteresis are known problems with continuous valves. This can lead to erratic and unpredictable behavior in a hydraulic proportional valve. The stiction prevents the movement of the valve spool if the changes of the input signal are too small. When the signal finally becomes large enough to initiate movement, the piston will tend to overshoot the position required for accurate control. Hysteresis is the tendency for the spool shift to be different depending on whether the input signal is increasing or decreasing, even when the input values are identical. This problem is solved through the use of dither. Dither is a rapid, small movement of the spool around the desired position. It is intended to keep the piston moving to avoid stiction and average out hysteresis.

Benefits for the user

The PVA200 modules generate a constant superimposed dither current irrespective of the output current. Both the dither frequency as well as the dither amplitude, which can be between 0 to 30 percent of the rated current are set independently of each other. The dither can thus be optimally adjusted to the particular valve and to the characteristics of the hydraulic system.

CURVE CORRECTION AND CONFIGURATION

- *Characteristic curve correction with up to 20 support points per coil*
- *Tabular or graphical input of support points*
- *Adjustable current and flow (accuracy +/- 5 mA)*
- *Adjustable rising and falling ramps (0.1 s to 10 s)*
- *Adjustable dither amplitude (0 to 30 % of the rated current)*
- *Transparent current management in SolutionCenter*
- *Fault monitoring, short circuit and overload protection*

Safety without Compromise

Modern safety solutions using a programmable safety controller make it possible to implement functions that go far beyond the conventional emergency-stop chain. Bachmann offers a complete safety package that is successfully used in a wide range of different applications under the toughest conditions.

Master CPU A — Master CPU B — Master CPU A — Master CPU B

SLC284

NW 1
NW 2

SDO 204 — SDI 208

Slave Station 1 — Slave Station 2 — Slave Station 1 — Slave Station 2

EMERGENCY STOP

[M]

— Safety Network I
— Safety Network II

Master station fails:
– Safety circuit 1 trips
– Safety circuit 2 fully functional

Slave station fails:
– Safety circuit 1 trips
– Safety circuit 2 fully functional
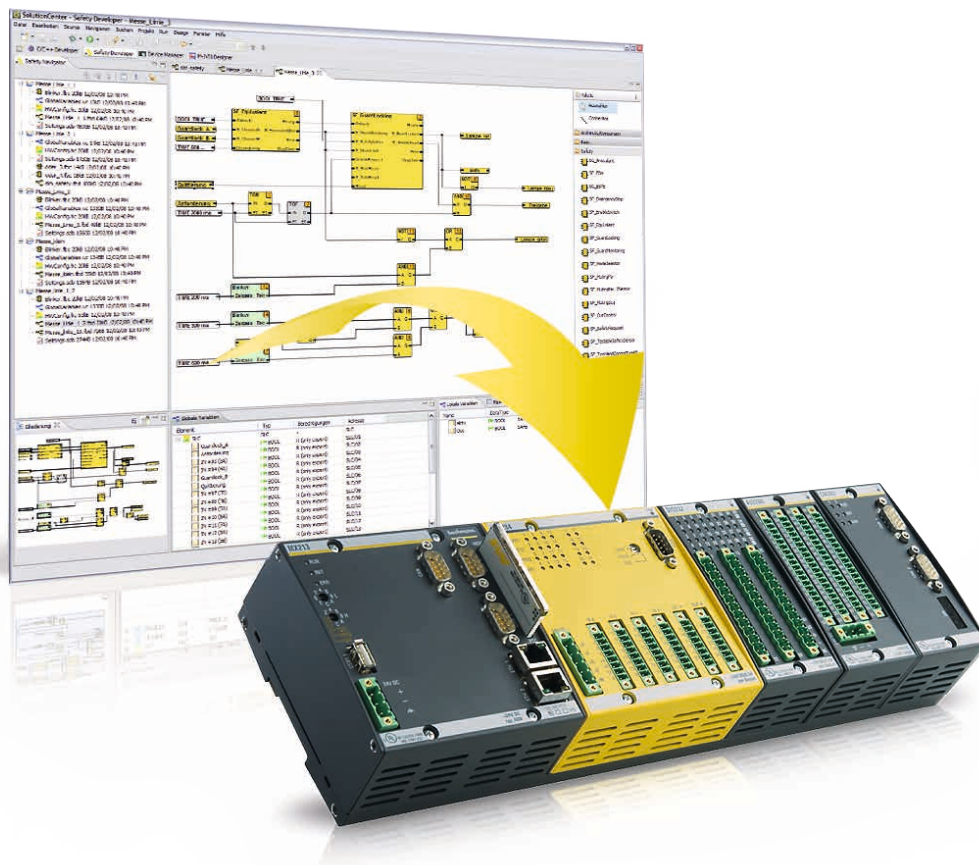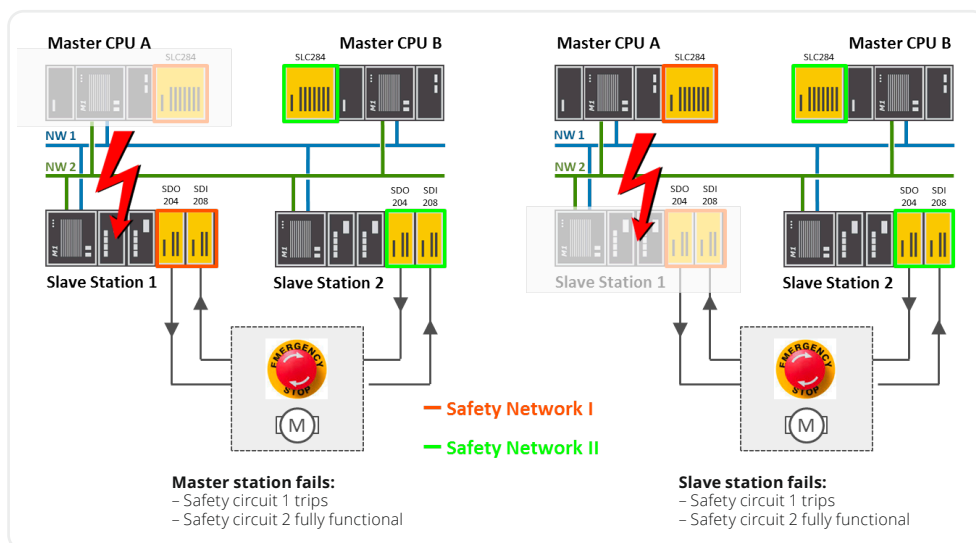
Fault tolerance

In modern machine and plant building, the protection of personnel and systems is regulated by the new Machinery Directive. This directive and the associated safety standards stipulate the use of the latest methods and measures in the implementation of safety devices in order to ensure the optimum protection of people and goods. In addition to this, each safety component is developed and tested under the supervision of a certification body. Operators of offshore installations and also shipping companies not only benefit from the increased personal protection provided but also benefit financially. Critical signals can already be acquired and evaluated using several sensors. An approved component such Bachmann's safety control PLC, combined with the integrated testing and monitoring functions, eliminates the need for multiple acquisition whilst keeping life cycle costs low.

Safety engineering under control

The safety components of Bachmann are ideal for use on ships and offshore plants. Operational management, control, safety engineering and operating devices are perfectly matched and offer open communication. The fastest possible response times, intuitive operation and comprehensive diagnostic options guarantee the highest possible level of safety. All Bachmann safety modules are certified with the highest safety category SIL3 and PL3 for machines and systems. The safety modules can be arranged within the plant control system as required, thus

enabling the implementation of individually tailored solutions. Safety channels that are not required can be used as standard digital I/Os without any restrictions. Safety relays can be replaced thanks to the 2 A outputs of the remote SDO204 output module. This saves space, wiring effort and additional costs. With the integration of the Safety Developer in the SolutionCenter engineering tool, Bachmann makes safety programming easy for the user on the basis of established standards such as IEC 61131-3 and PLCopen Safety.

Keeping it safe with Bachmann

All the safety modules of Bachmann, together with the necessary programming tools and function blocks, have all been certified according to the relevant standards by the TÜV Süd certification body. UL508 approval also ensures safety when operating in North America. All modules are available as coldclimate versions. Safety is thus also guaranteed in extreme environmental conditions.

Benefits for manufacturers and plant operators

Programmable safety engineering makes practical implementation and daily use easy. It enables the secure monitoring of all the internal states of an installation during operation, including the safety circuits, also via teleservice functions. Bachmann offers you tailored solutions based on the experience gathered from the successful use of control components in offshore installations all over the world.

SAFETY STANDARDS AND REGULATIONS

- IEC 60945
- IEC 61508
- ISO13849
- IEC 62061
- EN 61511

PLCopen safety

TÜV SÜD

27

Controllers with Long-Term Availability in Shipbuilding

Saving Resources

The service life of ships and offshore platforms is normally meant to last for decades. This means that the automation systems have to be available for a very long time as well. Long-term availability here primarily means two things: Firstly the long service life of the components and secondly, the possibility to easily replace hardware modules or make system enhancements to hardware and software even after 15 or 20 years.

The maintenance of the availability of onboard machinery and plants is always the key objective. For this the automation components must be able to run continuously in failsafe operation. This requires AAA quality and a proven high level of reliability. If a device replacement is nevertheless required, the controllers must be 100% compatible both mechanically as well as functionally. Functional compatibility is important so that no software adaptions are required when a module is replaced. The controller must be mechanically compatible so that the new device can be replaced and connected 1:1 in the existing system.

Quality standards

Highest quality standards in product development and manufacturing are the foundation of long lasting automation components. At Bachmann, a quality assurance system to ISO 9001 has already been in place since 1996. The development standard based on the V model, in which each development phase has a corresponding test phase, has already been in place at the company for 15 years. The detailed and complete documentation of all processes in development and production gives Bachmann still today easy access to articles over 20 years old, so that they can be produced as repair spares according to the same standards and processes as for the latest products. Bachmann designs and manufactures its test equipment itself. The in-house development of test equipment ensures that testing and measurement processes meet the latest technological and normative standards as well as providing the possibility to test if necessary older equipment which has to be delivered as replacements for repairs.

Intelligent component management

A module is only as good as the components it consists of. That's why Bachmann only relies on high quality components from reputable suppliers. All incoming components also have to meet a host of other criteria as well as providing the basic function. In an extensive process, a team of experts examine components in terms of supply security, quality, failure probability, price, identification, packaging, approvals and naturally correct operation. Their processing by the manufacturing department is inspected and the development department carries out function tests up to the limit of the load tolerance. Incoming goods tests are then defined and audits are carried out with manufacturers and suppliers if required. Only when the result reports do not show any objection to the use of the components does the automation specialist release them in the article master data for the defined applications. Through intelligent supplier management, Bachmann ensures the long-term availability of each individual component by using only reliable manufacturers and robust technologies as well as running a second source strategy. All components are also monitored in a database in relation to their life cycle, which can lead to warnings like "do not use for new developments" right through to the active replacement through redesign. Bachmann thus ensures that all required components, even after 15 or 20 years, are available to make replacement equipment.

Climatic test

In the development phase, a wide range of different internal specification tests are performed in accordance with the standards and requirements of certification bodies. These

include climatic tests according to the European standard EN/IEC 61131-2, which lays down the equipment requirements and tests for programmable controllers. All automation components at Bachmann also undergo temperature change tests according to EN/IEC 60068-2-14 (test Nb). The highly accelerated life test (HALT) climatic and stress test subjects the test objects to conditions that are more severe than in an Arctic climate. The HALT test exposes an electronic module for release to a climatic change test under full load and in excess of the normal operating temperature limits (from +90 to -60 °C).

The functional limits in the temperature range are tested first of all, i.e. the temperature range is continually extended at full load beyond the upper and lower limits in cycles until the device ceases to function. In the second test, the controller is subjected to vibration in all six directions across a broad frequency range and at increasing intensity every cycle until it fails. The shocks range up to 25 times the gravitational acceleration.

In the third step, an identical module is exposed to the combined temperature and vibration limits in which the modules previously still functioned until it fails. In these extreme conditions the test objects are effectively aged and damaged in order to determine any electrical and mechanical weaknesses early on. In this way Bachmann tests the electrical function of the device and its reserves, the component dimensioning as well as the electromechanical design, such as solder points and connectors. Only in this way is it possible to detect and rectify damage already in the development phase that would otherwise only appear during operation 15 to 20 years later.

Interference immunity thanks to in-house EMC laboratory

Automation products in the EU are required to observe the guidelines for electromagnetic compatibility. However, the measurement of electromagnetic compatibility (EMC) presents a particular challenge since the results cannot be predicted or

▼Iced up controller during a HALT test.
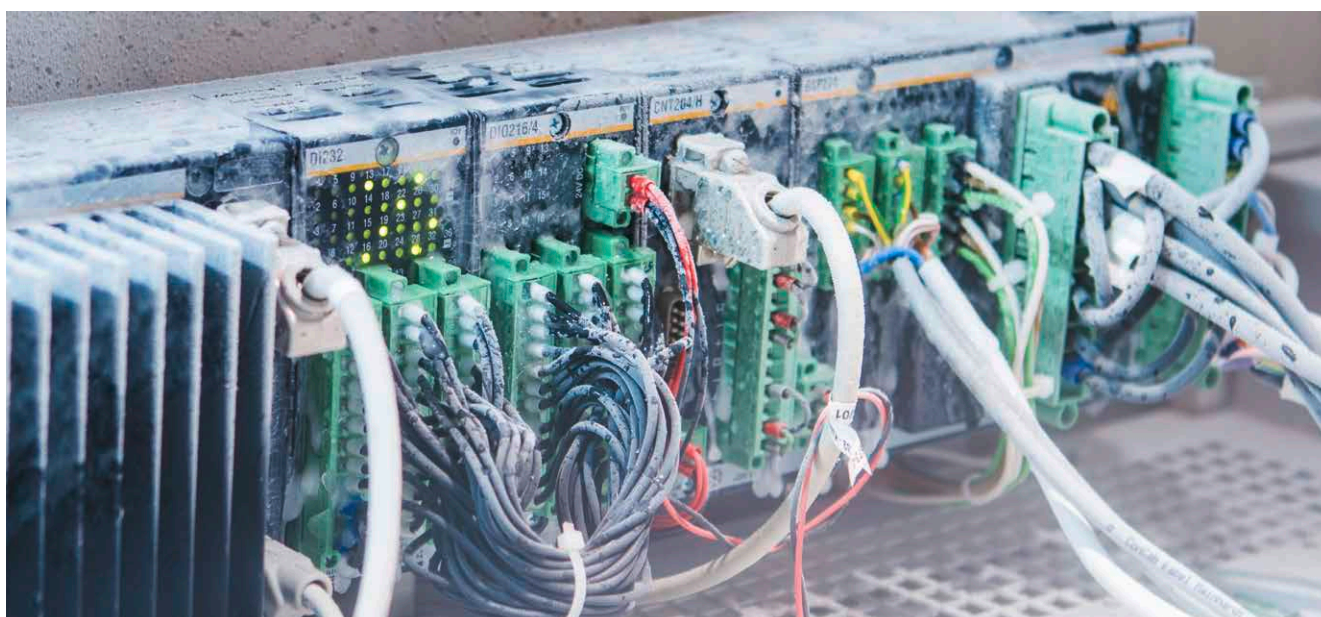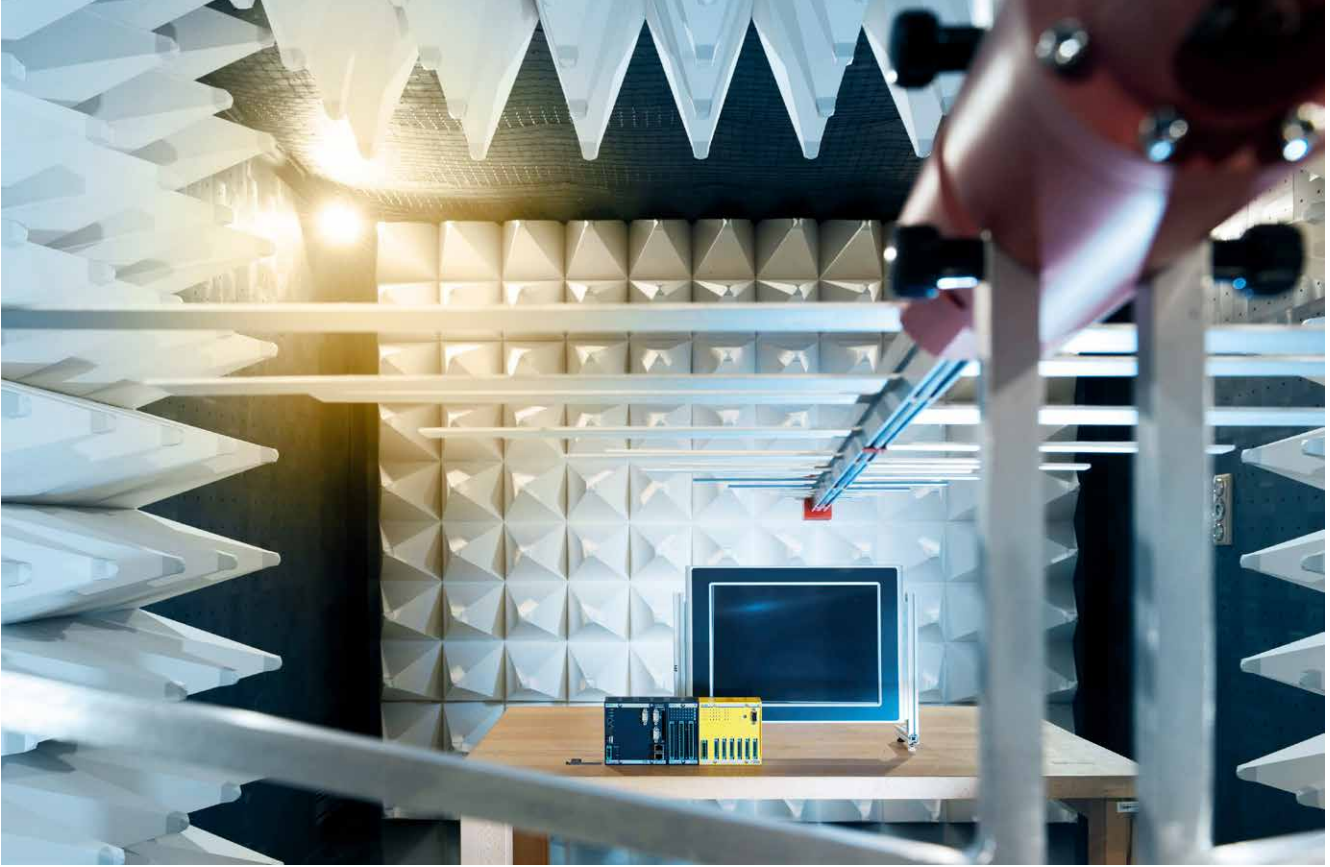
EMC test laboratory

simulated in every case. Bachmann has therefore set up its own EMC test laboratory, in which all the standard tests for interference immunity, such a electrostatic discharge (ESD), burst (interference from high frequency switch operations) and surge (high energy pulses caused by switching large currents) can be carried out. The standard here is set by Bachmann's own stringent EMC guidelines, which provide a large safety margin over and above the requirements of the general standard. The Bachmann EMC test bay can test emitted interference in a frequency range from 30 MHz to 3 GHz. Thanks to its advanced multiple shielding through shield plates, ferrite tiles and specially coated polystyrene pyramids, the chamber is designed for a frequency range from 1 MHz to 18 GHz. This makes it easy for Bachmann to test improvements to devices directly in terms of their EMC and implement them quickly.

Before production release
The following function tests include component tests, in which all modules are tested for features such as functionality, accuracy, response to faults, diagnostics, robust design, maintenance ability, usability and efficiency. As onboard PLC components are part of a highly diversified system consisting of different modules and programs, old and new software versions as well as different loads and operating modes, the system integration test department tests all relevant combinations of any new or modified devices and any software. System tests then test the specifications of the devices in the networked automation system. Only in this way is it possible to test the interaction with other modules or the effects of particular constellations. Individual acceptance tests are also carried out by the appropriate customer advisor for complex applications involving custom

developments and new developments. The production release for a new automation component is only issued when all the tests described have been successfully completed.

Quality in series
Quality assurance in series production starts with a visual inspection. This is an automatic optical inspection (AOI) based on an ideal picture. In this way, any mechanical deviations, such as short circuits, positioning errors, breaks or incorrect components mounted on the printed circuit boards can already be identified. Bachmann either removes any affected boards or reworks them. The detected faults are then reported back to the preceding process in each manufacturing and test step so that systematic problems can be rectified immediately. The subsequent InCircuit test (IC) applies power to the controller boards and is the first electrical test in the production process. This can detect fault patterns such as the following: short circuits, missing components, incorrect component orientation, tolerance problems, incorrect component values or unsoldered components. Bachmann's high standard of quality assurance is particularly demonstrated by the so-called run-in test, a climatic and function test, which every module has to undergo before shipment. For this continuous testing of the finished product the modules are placed in climatic chambers, in which they are switched on and off continuously at a particular rhythm for 48 hours and also through extreme temperature changes. This process creates the artificial aging of devices and thus induces the failure of any defective components. The probability of failure of electronic components is normally at its highest during the first few months of use and then not until the end of its service life. The expedited artificial aging provided by the run-in tests

enables the more susceptible initial phase of a device's life cycle to be avoided. This means that if faults are to occur at all, then this happens in the test laboratory and not on board. The 48 h run-in test thus makes a significant contribution to increasing the reliability and lifespan of Bachmann modules.

Intelligent design

Particularly in the development of automation components for shipbuilding, the observance of international standards plays an important part, as well as compliance with the guidelines of relevant certification bodies such as DNV GL, Bureau Veritas (BV), Lloyds Register (LR) or American Bureau of Shipping (ABS). The certificates of these authorized bodies ultimately verify that the products can be safely used for maritime applications. A design with maximum longevity is of key importance. Thanks to its considerable design reserves, the Bachmann modules have a particularly long service life. They are specified for ambient temperatures up to 60 °C, whilst only 50 °C is required as the market standard. This means that the modules have up to twice as high a lifespan during operation at ambient temperatures of below 50 °C. Thanks to the metal housing and high quality screw connections, the modules have a high degree of robustness. The high quality standards in product development and manufacturing have enabled Bachmann to implement automation architectures with a proven availability of 99.97 percent. The calculated values for the mean time between failure (MTBF) also verify the high degree of reliability of the modules: This is 200 years for CPUs, up to 400 years for digital I/O modules and 200 years for analog I/O modules.

Compatibility

Besides the quality of the hardware and software, their compatibility for a secure long-term availability is critical. Bachmann has therefore drawn up internal guidelines which define clear rules for compatibility and which are used at the same time as development guidelines. With this concept, Bachmann aims to enable the user to replace a CPU with a more powerful or newer one by simply inserting the memory card of the "old" CPU in the new one, and restarting the new one without any software adaption necessary, fully in line with the "plug & play" principle. Software design is playing an increasingly more important role with regard to compatibility. The architecture of the system software, such as the many possibilities of the engineering software for the M1 automation system, ensures that the user program is compatible over different controller generations. Bachmann's

entire automation architecture is generally designed to be modular and open, with the ability to be expanded flexibly.

This not only simplifies the use of the automation systems in mostly heterogeneous architectures on board, but increases long-term availability through the principle of backward or downward compatibility. The hardware modules can also be configured flexibly. The latest generation of Bachmann's I/O or function modules offers the same functionality on delivery as the module to be replaced. The special feature is that new functions, which for example were not yet possible years ago with the first delivery, can also be added by simply configuring in Bachmann SolutionCenter. This multi-function capability leads in many cases to the possibility for several older modules to be replaced with just one new one.

All Bachmann modules undergo a 48 hour run-in test in the climatic chamber.
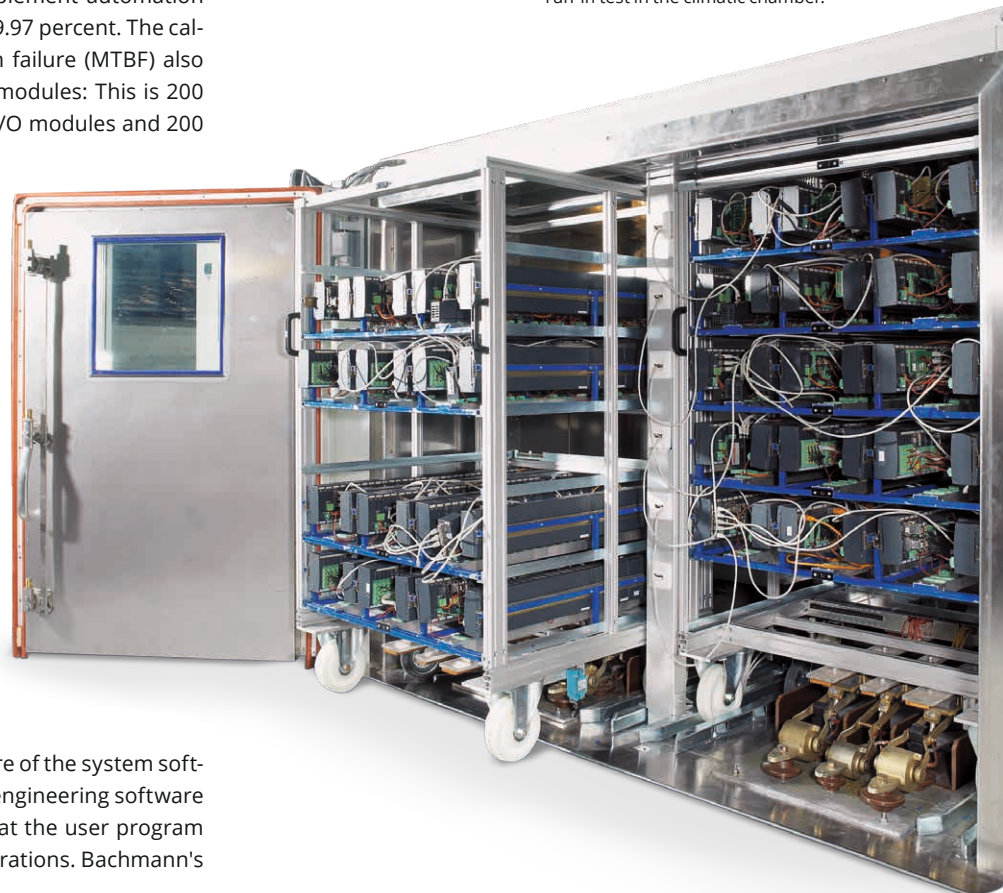
More Availability, Greater Yield

Condition Monitoring System

Drives for drilling equipment, excavator pumps, pipe handling systems, propulsion systems, control systems etc. are some of the critical equipment used in shipbuilding. The prevention of breakdowns and therefore also any unexpected downtimes for this critical equipment is the task of the 24/7 condition monitoring system for ship operation.

In conjunction with a method of forecast modeling, the CMS is required to detect potential fault conditions before actual damage becomes noticeable and critical. This should likewise provide sufficient time for implementing preventative measures and repairs or procuring spare parts.

First CMS to be fully integrated in an automation solution

The wear occurring on plants is primarily determined by the way in which the plants are subject to stress. "Stand-alone" condition monitoring systems were developed primarily for condition based maintenance. Having access to the relevant process variables online makes it possible to take the latest operating states of the ship into account. The M1 marine automation system is the first fully integrated and programmable CMS solution available that provides the appropriate hardware modules required for incorporating the various signals, as well as the necessary software. The M1 system analyzes the data combined from oil, water and vibration sensors with operating hours and operating conditions, as well as environmental factors such as waves, wind and currents. The wear process is closely related to the way in which the machines are used. It is even possible for environmental conditions and the movement of the ship to accelerate the wear process even with minor loads.

Minimizing system downtime

The system failures of shipboard machines can cause the shutdown of the ship's entire operation, thus resulting in a correspondingly high financial loss. For decades, every ship has been equipped with a central "alarm and monitoring system" that warns the crew in the event of a critical fault or critical values. The integration and use of analyzed CMS data is the next step towards minimizing system failures and notifying the crew in good time and as extensively as possible. However shipboard machinery is subject to a slow process of wear due to the stress it is exposed to during operation. This stress depends on environmental factors and on the way in which the crew operate the system. This slow process of wear cannot be handled by the conventional AMS system.

### Marine M1 automation solution

The IACMS Integrated Automation & Condition Monitoring System from Bachmann combines the control functions with the condition monitoring (CMS) and functions as a redundant data server for the AMS system. The operating personnel receive an online warning message in advance about the increasing wear, enabling the owner to reduce the life cycle costs of the fleet.

Increased performance and know-how

This display of online and on board information about the machine status with the same hardware that these systems are controlled and regulated with is not the only expertise that we offer.

Major benefits for crew and owner

The use of IACMS means that different systems on board can be controlled with the same hardware and software. This improves understanding and simplifies training for the crew, whilst at the same time reducing initial costs for the owner. If CMS data is fed to the ship management system, it is possible to make a continuous assessment of the current status and availability of the ship.
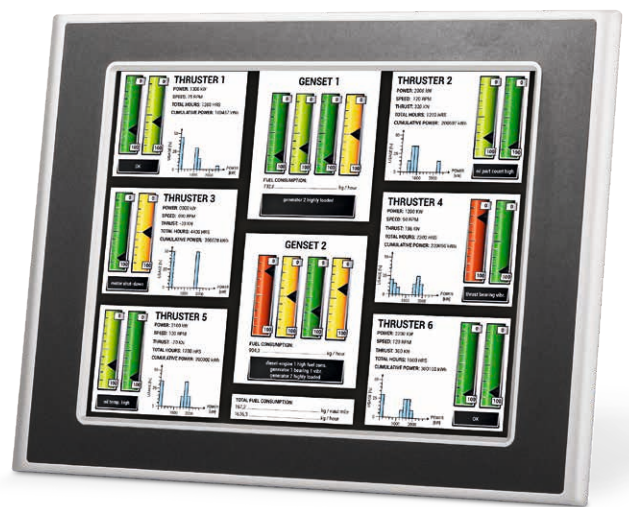
▼ **An example of the monitoring screen of an operator station.**

This example is of a semi-submersible with six controllable thrusters and four gensets driven by diesel engines.
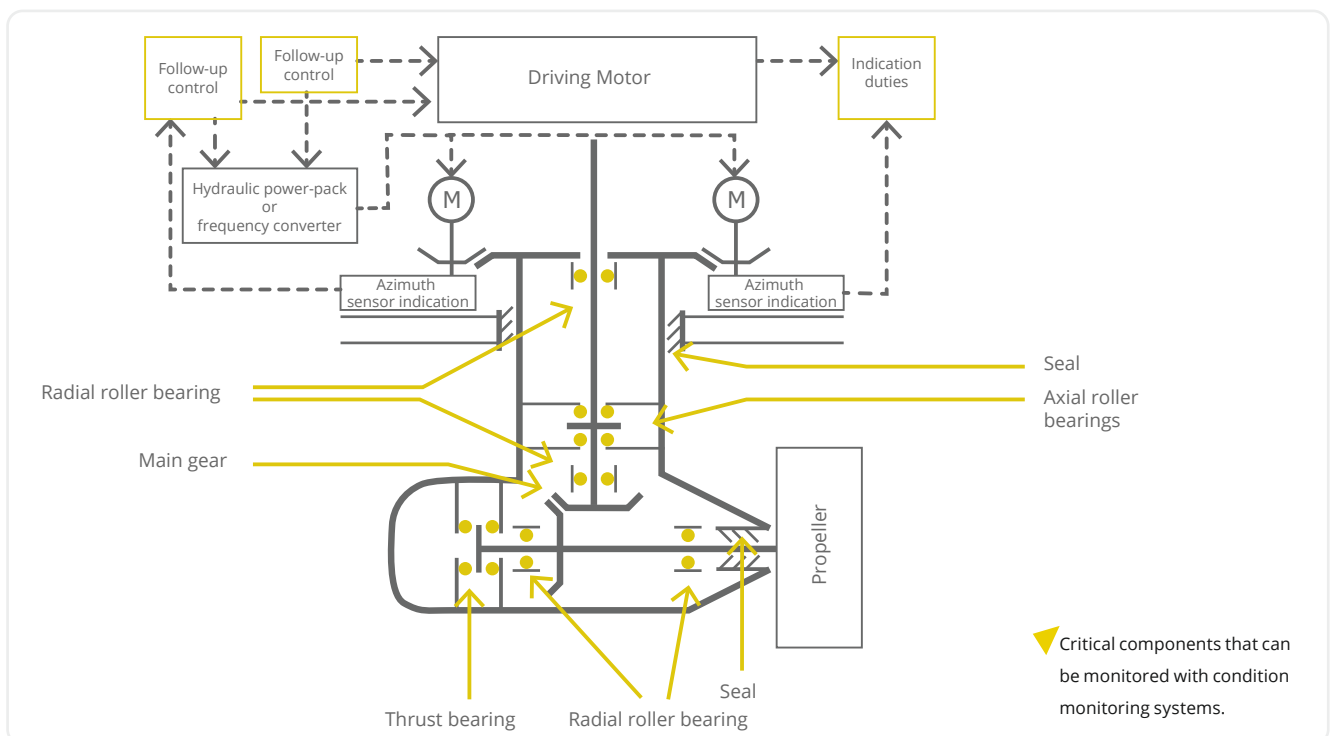
▼ Critical components that can be monitored with condition monitoring systems.

SCADA and HMI of the Future

M1 webMI pro

The widespread global use of Internet-enabled mobile devices has taken place at breathtaking speed. Their simple and intuitive operation is impressive. Internet and software applications no longer have a fixed location but can be used from anywhere in the world. With M1 webMI pro, Bachmann electronic is impressively demonstrating its technology leadership: Each M1 controller is turned into the central server for fixed or mobile HMI devices.

BENEFITS

- *Value displays with high refresh rate*

- *Any browser-based device becomes an HMI*

- *Operation and visualization when and where you need it*

- *Loss-free scaling to all screen sizes*

- *As safe as Internet banking (HTTPS)*

- *Short refresh in the browser instead of time-consuming software rollouts*

- *Use of the application on different devices (smartphone, tablet or stationary HMI devices)*

- *Integration in higher-level SCADA applications*

More on this topic is provided on our website

Engineering and maintenance – an important cost factor

Plants are becoming increasingly more complex with ever increasing requirements. This also naturally increases the effort required for engineering and maintenance as well. It is often not only necessary to allow for local visualization in the field, but also for the connection to a control center, a separate visualization for teleservice and sometimes also solutions for mobile terminal devices. Often each requirement here has to be implemented with separate applications. With many visualization products, the handling of different terminal devices and screen resolutions is also not possible.

Pure web visualization for the Bachmann M1

Bachmann electronic is now launching a powerful product for pure web visualizations on the market called M1 webMI pro. A slim-line web server that is directly installed on the M1 controller enables the connection of any visualization devices, such as smartphones but also powerful operator terminals. Provided the necessary authorizations are in place, the application can now be accessed from anywhere in the world. Thanks to M1 webMI pro all the important information can be shown in a single view and with stunning definition. Perfect graphic results can be achieved on any visualization page without any losses in quality when scaling and zooming. This is thanks to the extraordinary benefits of HTML5 and SVG (scalable vector graphics), the basis for all graphic objects.

State-of-the-art project engineering and simple delivery

The atvise® builder engineering tool is used for drawing process pictures, configuring animations and events as well as for other settings. A number of ready-made graphic objects and layouts, as well as the flexible reuse of pages using parameter transfers, make it possible to create visualizations efficiently. Integrated editors even allow the drawing of new SVG graphic objects or the creation of additional functions with user-defined Java scripts. Once the visualization is completed, this is transferred to the web server via FTP with just a single click. This makes the delivery of visualizations to large and distributed installations child's play. Time-consuming software installations on all HMI devices involved become completely unnecessary. The latest version of the application is always shown as soon as a client connects with the central web server or reloads the web page. Special installations or a restart of the HMI devices are no longer necessary. All operator units are thus automatically brought
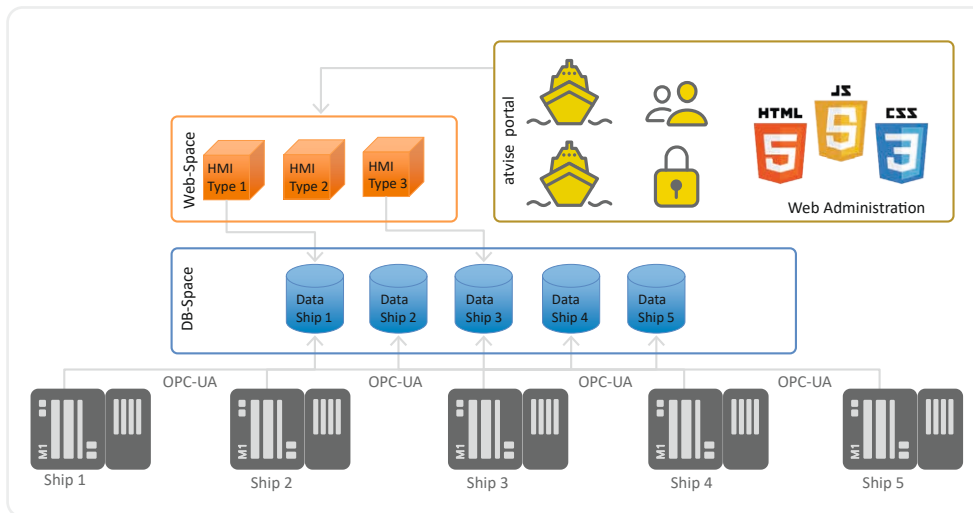
System architecture: Known atvise® technologies on a standard web server.

up-to-date – without any interruption and irrespective of time and place.

Increased efficiency included

The development of web technologies had to allow from the outset for a wide range of different terminal devices, since different screen sizes and resolutions are normally used. Visualization design in 'M1 webMI pro' is much easier however, since only a single application has to be created for all devices. If the visualization solution is also implemented directly on the controller, the configuration of the relevant data interfaces is also unnecessary: The variables can be accessed directly, an OPC server or any proprietary protocols become obsolete. Ultimately, this kind of web solution not only means more efficiency in engineering but also a real increase in cost efficiency.

SCADA with 64-bit power

The increasing complexity and the constantly rising level of automation in a wide range of different installations require future-oriented technologies for monitoring and controlling processes effectively. SCADA systems make a key contribution here and ensure a high level of safety. This is especially the case if they offer, like the atvise® product line, operation that is not restricted to a particular location or device. The atvise® scada control station combines the latest web technology with a high performance client-server architecture.

While user interfaces can be displayed in web browsers without any installation required, central functions such as process connection, historization, alarm signaling can be run in highly efficient server structures. The full utilization of the internal data structures of the latest processors increases system efficiency. At the same time, the 64-bit data width enables the utilization of considerably more main memory

which ultimately allows larger projects with more process variables (nodes). Released operating systems include Windows XP SP3, Windows 7 (32-bit and 64-bit), Windows 8 (32-bit and 64-bit), Windows Server 2008 and Windows Embedded Standard 7. Besides other minor improvements, version 2.5 also contains functions for filling in the process history (value archive) at a later time, such as when the transfer of only temporarily connected process connections is blocked.

State-of-the-art visualization solution on a tablet: Ship control in pure web technology.
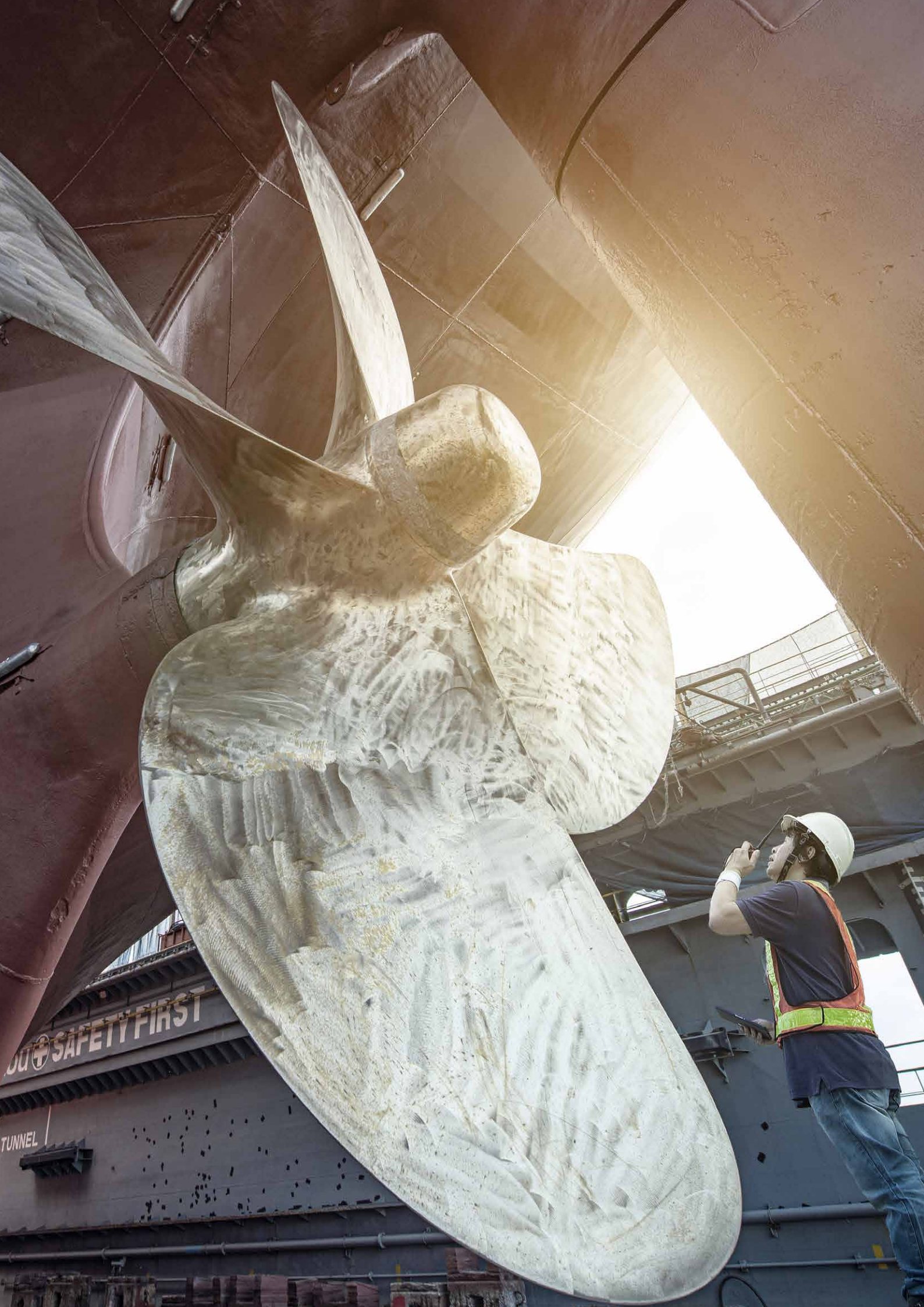
Benefit from our expertise

— *Bachmann Training Offerings*

A solid know-how in conjunction with first-class products is the key to perfect automation. We offer you both. Take advantage of our extensive training program, which we will gladly adapt to your individual needs.

SolutionCenter

The SolutionCenter as an integrated and user-friendly engineering tool for project engineering, commissioning, configuration and diagnostics. The training also includes an introduction to programming and visualization.

Model Based Design

The MATLAB® program package from MathWorks offers a software tool for the model-based development of controller applications. M-Target for Simulink® enables the user to integrate seamlessly in this development process inside the M1 controller environment.

M1 Webmi Pro

atvise® provides the user with a web-based visualization for different applications and visualizations. Mobile application, HMI up to SCADA solutions can be implemented with only one visualization. Standards such as HTML5, SVG and JavaScript enable very open and flexible solutions for any application. At the end of this training seminar each participant will have created an extensive sample project.

Redundancy Control

This training course provides a rapid introduction to configuring and creating redundant applications with the M1 automation system.

Power Management

The safety and efficiency of the electrical energy supply are placing increasing demands on generation, transmission and consumers. This training seminar provides the knowledge required to use Bachmann grid measurement, monitoring and synchronization modules in the M1 controller system.

Safety Control

This seminar offers a practical and basic understanding of how to implement functional safety. You are shown how to program safety applications based on the Bachmann safety products in hardware and software.

Condition Monitoring System

Condition monitoring involves the monitoring of the machine state through the measuring and analysis of meaningful physical variables. The training covers the basics of condition monitoring as well as providing a detailed knowledge of the hardware and software.

Always keeping up-to-date

Engineering training seminars

Even if the training needed for engineering is kept to a minimum thanks to the standard development environment: Updating and deepening one's knowledge of individual engineering areas at regular intervals is worthwhile. The combination of the user's sound knowledge with first-class products is ultimately the key to perfect automation.

BENEFITS

- *Perfect program adaption to individual requirements thanks to the modular concept*

- *Intensive knowledge transfer through hands-on training*

- *Training seminars held on site at Bachmann or as webinar*

- *Access to the in-depth knowledge of Bachmann application engineers*

More on this topic is provided on our website

Precisely tailored training seminars

Bachmann's training offering ranges from the proven standard training seminars right through to workshops tailored to your individual requirements. The modular training concept enables the creation of training programs tailored precisely to company requirements. The training is always centered around an intensive knowledge transfer and hands-on practice with special problem solving tasks. The training sessions are held either in a Bachmann branch office or directly on site at the customer's premises. Individual modules can also be offered as webinars if required. Following each training course, the participants will receive a personalized certificate.

No questions unanswered

If a question remains unanswered despite the extensive training offer, Bachmann customers benefit from the know-how of several application engineers. These work in close proximity to the development team. They know every small detail of the Bachmann solutions and can therefore make use of all options available.

Basic Training	User Training	Advanced Training
Basic knowledge of automation required	Basic training and specific knowledge recommended	Basic training and specific knowledge of programming required
Bachmann automation	PLC programming	Maritime Applications
		Redundancy
		bluecom (Ethernet real-time protocol)
	Visualization M1 webMI pro	Advanced Visualization M1 webMI pro
	atvise® SCADA	
	Motion Control	
	Condition Monitoring	
	Grid measurement and monitoring	
		Programming with C/C++ Developer
		Application development with M-Target for Simulink®
Safety technology	Safety technology (Safety Developer)	Model-based development with MATLAB® / Simulink®
Service technician		Customer-specific workshops

Trust through Expertise

Applications in the maritime sector

Many of the leading global manufacturers and operators of ship and offshore plants rely on us. Together with them, we are setting new benchmarks and achieving new success.

Special safety concepts ensure a high level of reliability and safety for a ship propulsion system. New functions are continuously being integrated in the ship's control system. A collaboration between Wärtsilä SAM Electronics and Bachmann electronic produced an innovative concept for use with diesel electric drives.

▼YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

The Dutch company CSI Control Systems is renowned for its expertise in the field of alarm and monitoring systems for the marine and offshore sector. Successful operation on the market with these kinds of solutions also requires a reliable and powerful hardware as well as extensive knowhow. Criteria that Bachmann electronic fulfills – thus providing the basis for the successful partnership between both companies.

▼YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

The automation of ships requires the management of some complex tasks. Argonics GmbH has broken these tasks down into manageable platform and has thus been able to create some innovative products. The modular platform from Bachmann electronic and its networking capability enables the concepts of Argonics to be implemented easily, thus simplifying routine ship operations.

▼YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

SANDERMARINE
MARINE + OFFSHORE EQUIPMENT

Wilhelm Sander Fertigung (WSF) has developed SANSYS and the associated SANVISU operator interface, a new integrated valve control and tank management system for ships that was type tested and certified by GL. In the event of a disconnection or a failure of the main components, SANSYS provides universal redundancy and network redundancy. The system is made up of solutions from the portfolio of Bachmann electronic.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

VOITH

The specializations of the Voith technology group include the area of propulsion components and systems for shipping. For over 80 years the company has been developing and manufacturing the optimum propulsion system for all ship types – ferries, platform suppliers, tugs or support ships.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

BAKKER SLIEDRECHT

Propulsion control systems for ships normally undergo factory testing or are tested with prototypes during commissioning. As these systems are becoming increasingly more complex, complete testing within a limited period of time is difficult. Bakker Sliedrecht has joined up with Bachmann electronic and Controllab to create a new model-based simulation process.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

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blue|ctrl

The openness of the system solution and its verification by standard shipping certificates were the reason why Ulstein Power & Control AS turned to Bachmann. Using the M1 controller as a basis, they created an automation system that can integrate any number of function units and be adapted to special customer requirements – and not just in shipbuilding.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

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pliant
partner in technical solutions

Cable laying for offshore wind turbines works with M1 automation from Bachmann. In the middle of 2014 Van Oord, a solution supplier for dredging coastal areas and building plants for offshore power generation, launched the cable laying vessel Nexus.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

With its DENS-ITOMETER, the British company ITS (Industrial Tomography Systems) has managed to develop a measuring system that operates without the need for a nuclear energy source. It thus offers a greener and inexpensive alternative to conventional devices for this task. The rugged systems of Bachmann electronic have made a vital contribution here.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

An analysis of the measuring technology on the FOMO4524 medium-speed 700 kW research engine at the Flensburg University of Applied Sciences uncovered several weak points that had developed over the years. Besides hardware faults, both the programmable controller (PLC) and the evaluation software contained settings and results that were no longer plausible.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

Offshore operations have increased rapidly in recent years: Wind turbines are thus becoming increasingly larger and wind farms are being located increasingly further away from the coast. To make their installation possible, ships have been continually adapted for operation in rough seas. However, up to now very little attention has been paid to cranes and their central task – lifting.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

To achieve efficient and environmentally vessel operation, control system requirements are diverse and manifold. Controllers should allow the integration of hybrid drive systems, offer the highest reliability, be internet-enabled and as flexible and economical as possible. This is why the Schottel group relies on high-performance control systems such as Bachmann's M1 system.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

AVAT GmbH has established itself worldwide as a reliable and competent engineering partner on the market. The Tübingen-based company has been well-known amongst reputable manufacturers of large engines. The core of the AVAT system solution is the M1 control technology of Bachmann electronic. This provides flexible maritime automation with open software and hardware.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

besecke automation

A ship repair often also involves the replacement of a large section of the automation system. In this operation the technology is brought up to the state of the art and made ready for the challenges of the future. besecke GmbH & Co. KG was awarded a repair order requiring the replacement of the machine controls. For this, they approached Bachmann electronic.

▼ YOU CAN READ THE COMPLETE ARTICLE ON OUR WEBSITE

Van Oord
Marine ingenuity

The two Dutch companies Alewijnse and Van Oord together with Bachmann electronic have a lot in common: All three are progressive, independent family-run companies and are some of the best in their sector. They have been working together successfully for nearly ten years. The experts of the three companies know each other well.

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DIMAR-TEC PTE LTD

The reduced consumption of resources and reduced CO_2 emissions are also an important issue in the shipping industry. The "Fuel Efficiency Controller" (FEC) from DIMAR-TEC offers a system that measures the actual fuel consumption with a high degree of precision in accordance with ISO 3046 requirements.

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Nedstack PEM FUEL CELLS

Hydrogen is considered one of the most promising options in the search for alternative shipping fuels. It could be used to generate emission-free electricity for propulsion, as well as for the on-board supply of energy. To discover how far this technology has come, and how green it is today, we talked to Jogchum Bruinsma, Application Manager Maritime Systems at PEM fuel cell manufacturer Nedstack.

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REINTJES POWERTRAIN SOLUTIONS

REINTJES is renowned for the production of high-quality, reliable maritime gearboxes – built for many years of continuous operation. The Hamelin-based company relies on continuous condition monitoring for early fault detection and failure prevention. With initial monitoring systems already in operation, the maritime specialists are now exploring AI solutions and data comparison across entire fleets.

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bachmann.