
Bachmann MPC240 Datasheet



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▼ News ▼ Applications ▼ Product & Technology ▼ Topic *CONTROLLING AND MONITORING*



ENERGY FOR THE FUTURE

Partnership produces sustainable solutions

THE PLANT IN VIEW

HMI and SCADA
The next generation

bachmann.

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TOPIC

CONTROLLING AND MONITORING

THE PLANT IN VIEW

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Dear Readers,

True to the spirit of “There’s a lot to do, so let’s get started,” Bachmann has recently expanded its portfolio. By focussing on our expertise in complete solutions in a challenging environment, we have been able to win some prestigious new customers and impress long-standing business partners with our extended offer.

Our employees have come back to their offices from the latest sector fairs, such as the Husum Wind and the SMM-Marine in Hamburg, with great enthusiasm and pioneering spirit. Very positive feedback, also from the key machine building and industrial sectors, as well as concrete orders, are for us all the best confirmation of a commitment that has not diminished, even in difficult times. More about this inside this issue. I wish you a highly enjoyable read.

Yours sincerely,


Bernhard Zangerl
CEO

TOGETHER. MAN. TECHNOLOGY. ENVIRONMENT.

Energy for the future

A breath of family life is blowing through this issue of realtimes. The spirit of togetherness, based on trusting and open relationships, makes a lot possible. Whether as partners in the machine building sector, the marine sector, or in renewable energy projects. Wherever customers, employees and suppliers explore new ways together, sustainable solutions can be found – such as emission-free batteries or new multi-tasking in automation. And much more. Welcome to the world of Bachmann.

FULL SPEED AHEAD

» *Good cooperation is the basis for everything. Whoever heads out to sea with Bachmann electronic will have an ideal partner with them. Thanks to their advanced control technology for our ballast water systems, our customers always stay on course.*

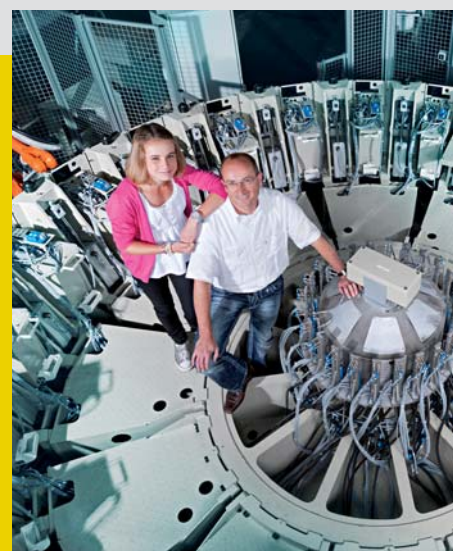
Michael G. Czapp, area sales manager,
Lars-Ricardo Grube, school student
Wilhelm Sander Fertigung GmbH,
Bremen, Germany



ONE VIEW. ONE WORLD

» *There's a lot to discover. As a reliable technology partner, we are designing the future with technical know-how that excels in every situation thanks to its absolute reliability. Looking ahead together opens new horizons.*

Bernhard Zangerl with son Julian
CEO Bachmann electronic



ENERGY CARRIERS OF THE FUTURE

»» *Always One Step Ahead. The world thinks anew and we think with it. We see the future of renewable energy. Biogas plants and biomass power plants make a considerable contribution to energy independence. It's good that there are innovative companies like Bachmann.*

Christoph Schmidt with son Jan



IF THE SHOE FITS

»» *Even our children understand this. You can go far with the right shoes on. This also applies to the world of work. With Bachmann electronic we have found the right shoe for us. The perfect controller coupled with powerful industrial PCs clears the way forward to success.*

Jörn Vonau with daughter Joana
Manager of control technology,
Klöckner Desma Schuhmaschinen
GmbH, Germany



TURNING ON THE WHEEL OF TIME

»» *Not only the wind knows the answer when it comes to the control of our e.n.o. 92 plants. Bachmann electronic supplies us here with the ideal control systems. And the excellent condition monitoring makes all the information available for detecting impending failures early on and for planning maintenance work in time. Let the future come. We will be there.*

Rainer Leskien with son Jonas,
Wind & Site, e.n.o. energy, Rostock, Germany

EMISSION-FREE LARGE BATTERY SYSTEM OF THE FUTURE

Proven reliability and a worldwide market presence bring Bachmann and GILDEMEISTER together. An emission-free large battery system of the future is the focus of the cooperation.

The CellCube large battery from GILDEMEISTER energy solutions is regarded as a milestone in the history of regenerative energy management. Whether in combination with wind power plants, biogas generators, PV installations or in parallel grid operation – the vanadium redox flow battery ensures an uninterrupted power supply. It is unsusceptible to changing weather conditions, temperatures, length of daylight hours or unstable grids. The integrated approach of the system is implemented with the M1 automation system from Bachmann electronic.



▶ **Efficient performance and safety at the highest level:** The CellCube – the large battery system of the future.

GILDEMEISTER
energy solutions

DMG MORI SEIKI

Cellstrom GmbH is part of the GILDEMEISTER Group and is responsible for the development and production of energy storage systems in the Energy Solutions division. The Austrian company, headquartered in Neudorf, Vienna, has been successfully developing and producing storage systems based on the vanadium redox flow (VRF) technology, and is thus making an important contribution in the field of on-demand uninterruptible power supply.

As part of the GILDEMEISTER Group, GILDEMEISTER energy solutions develops for industrial customers solutions for the generation, storage and use of 100 percent green energy. With products in the fields of wind power, solar power generation, and energy storage using large battery systems, the corporate division based in Würzburg, Germany, offers a comprehensive portfolio for the optimum use of regenerative energies. The customers benefit here from over 140 years of know-how in machine building that the company has gained.

SUCCESSFUL DEVELOPMENTS

Since 2002, the subsidiary company has already developed storage systems based on vanadium redox flow (VRF) technology. The first commercial and series produced VRF energy store with a 10 kW power output was launched in 2008. After the 200 kW system was launched at the beginning of 2011, GILDEMEISTER also caused a sensation in 2012 with the presentation of the new product series in the 10 kW to 30 kW range, and the large energy stores with outputs of 200 kW to 2 MW.

TRUST IN BACHMANN SYSTEMS

The company was in search of an industrial controller which ensures the reliable and safe use of the modular product family of VRF energy stores, the so-called CellCube, that has been available on the market since June 2012. "The widespread use of Bachmann products in the market for regenerative energy, particularly in the field of wind power and CHP units was one of the reasons why we chose the company," explains Stefan Haslinger, product manager for technical project management at Cellstrom GmbH. "This demonstrates the high level of trust that customers place in the robustness and stability of the Bachmann controllers."

REQUIREMENTS PROFILE OF THE PLC

Whilst the very important requirement of stable operation in regenerative energy applications was already fulfilled on the industrial controller, the robustness and reliability of the PLC were tested again. Extensive safety and performance tests were carried out as part of the

prototype development, and the controller was already installed in the first plants for customer applications. "Bachmann provided us here with leased and testing systems for twelve months," Stefan Haslinger recalls. "We also appreciated the very good support provided by Bachmann."

DEMANDING BATTERY MANAGEMENT

The Bachmann M1 controller is used in the battery management of the CellCube FB 200–400 with a 200 kW power output and 400 kWh energy output. These can also be connected to form energy store clusters with up to 2 MW output. Besides sensors for monitoring the temperature and pressure of the redox flow fluid section, the battery management also includes actuators, pump drives and interfaces to different bus systems and much more. "The M1 was therefore required to control and monitor the entire battery management system, as well as to ensure communication to cluster and park management systems," the product manager describes.

INTEGRAL APPROACH

The M1 is also used for the cluster management of the MW plants and in park management. The control of the MW system in the recently opened GILDEMEISTER energy solutions park in Bielefeld, consisting of PV, wind power and storage systems, is therefore implemented with a Bachmann solution. "Bachmann thus made it possible to implement the integral approach of the system," Stefan Haslinger concludes.

BACHMANN IN OPERATION

An MPC270 controller with a CM202 CAN master were selected from the Bachmann portfolio to manage 80 serial bus interfaces to the DC links which autonomously



**Dipl.-Ing. Dr. techn.
Stefan Haslinger**

Product manager / technical project management, Cellstrom GmbH (GILDEMEISTER energy solutions)

»The M1 provides an excellent basis for the further development of the control system for our CellCube energy storage systems.«



▼ **Monitoring service function:**
 All important operating parameters can be called up online at any time, e.g. the state of charge (SOC), electrolyte temperature or charge rating. An optional monitoring touch display can be fitted to the battery at additional cost.

regulate the charging and discharging of the energy store. "The Ethernet and serial RS232/RS485 interfaces provided on the MPC270 are also used and are a particular benefit," Stefan Haslinger describes in detail.

In addition to this, three AIO288 analog modules and an AI208 module are used to integrate pressure sensors and cover the processing of analog signals. A DIO280 and a DI232 module are used for controlling the digital signals. I/O modules are primarily used because of the flexibility they allow in the configuration of inputs and outputs. The described configuration in a controller, consisting of several analog and digital inputs and outputs, as well as several interfaces, enables the holistic integration in a 200 kW energy storage system. The controller system is also used in the cluster and park management system, if several 200 kW systems are connected together to form storage solutions of up to 2 MW.

OPTIMUM MATCH

"In our view, Bachmann offers a comprehensive product portfolio with a large selection of modules that enable the industrial controller to be matched perfectly to the sensors, actuators and interfaces used," Stefan Haslinger expresses his delight with Bachmann. The product care and the continuous further development of modules which are closely designed to meet customer demands enable GILDEMEISTER energy solutions to follow a long-term development strategy based on Bachmann modules. "Even with the continuous further development of our CellCube storage systems, we are always ensured the optimum use of the Bachmann industrial controller," the product manager expresses his praise. ■

»In our view, Bachmann offers a comprehensive product portfolio with a large selection of modules that enable the industrial controller to be matched perfectly to the sensors, actuators and interfaces used.«

**Dipl.-Ing. Dr. techn.
 Stefan Haslinger**

CellCube FB 200–400	
Charge rating	200 kW
Discharge rating	200 kW
Energy storage capacity (use independent of performance)	400 kWh
Duty factor/response time	< 60 ms
Weight, dry state	20,000 kg
Weight, loaded state	60,000 kg

THE SCADA ADVANTAGE

Bachmann expands its portfolio



Bachmann electronic GmbH has been the majority shareholder of Certec EDV GmbH since the beginning of the year. Bachmann has thus been able to expand its product portfolio with innovative technologies and further strengthen its expertise in complete solutions. The combination of product services and the specific technological lead will enable both companies to generate considerable additional value for their customers.

Certec EDV GmbH is an Austrian company headquartered in Eisenstadt. Since its founding in 2005, Certec has specialized in the development of HMI and SCADA systems in pure web technology. As part of the Bachmann Group, Certec will thus add software solutions based on the latest standards for visualization and central control technology (SCADA), which also enable industrial plants and processes to be visualized and operated from any location. With around 20 employees, the company stands out on account of its extensive application know-how and many years of experience.

SCADA AND HMI SOLUTIONS OF THE FUTURE

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 the high level of safety. This is especially the case if they offer, like the Certec atvise® product line, operation that is not restricted to a particular location or device.

FOCUS ON COMPLETE SOLUTIONS

The customers benefit from the collaboration of the two companies: Bachmann is the first manufacturer able to combine fully developed real-time automation, groundbreaking man-machine interfaces and process control technology under one roof. "Web technology is the key to state-of-the-art operation and visualization from any device and location," explains Bernhard Zangerl, CEO of Bachmann electronic. "Our positioning as a supplier for complete solutions is the most important cornerstone of our corporate strategy. The merger with Certec is therefore another logical step."

SECTOR-SPECIFIC SOLUTIONS

All Certec product lines will continue to be available. As well as general non-sector specific products, specialized sector solutions will be developed in future, such as for renewable energy. "The long-term and worldwide development of new technologies can only be achieved in close partnership with manufacturers like Bachmann," Michael Haas, CEO of Certec, is convinced. ■

THE PLANT IN VIEW

atvise® – HMI and SCADA
the next generation

Through the merger with Certec, Bachmann electronic has added a completely new product to its portfolio: atvise® is a product line that offers an impressive purely web-based visualization solution (HMI) and process control system (SCADA). This solution is revolutionary, as it is based on the latest relevant web technologies and is thus able to run the visualization on all commonly available web browsers without the need for additional plug-ins such as ActiveX, Java or Silverlight. Customers are thus given unrestricted worldwide access to the controls of their installation in the easiest possible way.





Certec is headquartered in Eisenstadt, Austria, and as a company of the Bachmann Group, develops software for operating and visualizing installations and industrial processes. The implementation of the atvise® product line used the latest technologies to overcome typical restrictions: The fully featured web technology based visualization puts the Internet in the service of the automation world. The implementation of applicable industrial and communication standards (such as OPC UA) reduces the effort required for engineering and maintenance to a minimum.

STANDARDS FOR THE FUTURE

By focussing on international standards (e.g. HTML5, SVG vector graphics, TCP/IP), client installations become unnecessary: Only a web browser is needed to make visualizations available both on any plant level and also for remote maintenance – anywhere, anytime and on any browser-enabled end device. The result is outstanding: The effort required for operation and maintenance is considerably reduced. A further benefit of the latest Internet expansion stage (Web 2.0) and the smartphone era is the fact that they offer virtually unlimited possibilities in graphic design with maximum access security.

Typical web content such as videos or geographic web maps can be incorporated in an atvise® visualization system without any problem. Standards-compliant innovations, which Internet giants like Google™ or Microsoft™ are further advancing within the scope of W3C, are also directly available to the user.

atvise® makes no compromises: The products are based completely on standards and don't just come with a "makeshift external connection". In this way, performance, expandability and simple use are guaranteed.

EVERYTHING SIMPLE –MINIMIZING EFFORT

The benefits of atvise® are plain to see: The effort for the user is considerably reduced – in all areas. The basis of atvise is a slim web



In industrial automation there is an increasing demand for information provision with regard to secure and person-based operation and process control.

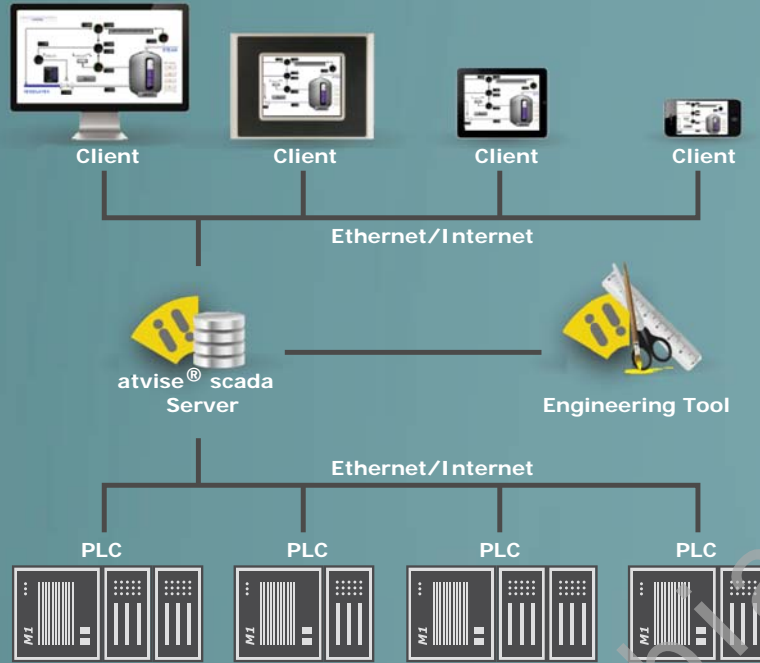
Matthias Schagginger

R&D responsible
for tools & runtime at
Bachmann electronic



server with an integrated data connection. This can either be installed in a single stand-alone terminal device or on a server together with a full-featured SCADA core. The web compliant SVG graphics guarantee optimum display quality, maximum performance and loss-free scaling for all resolutions – from the mobile terminal device to the large screen. Design and configuration can be carried out on any PC using the "atvisebuilder" engineering tool – a complete and intuitive tool that also comes with a script and source editor. The tool accesses the server via LAN or the Internet and enables data objects to be created, alarms to be configured, or process images to be drawn online – whilst the plant is running.

A number of preconfigured standard objects and operator panel layouts are provided that can be created with the onboard tools of the atvise® graphic editor and can thus be fully adapted by the user. User-defined objects can also be developed and preconfigured dynamic attributes assigned to these elements. Once the operator interfaces have been created, they can be used immediately on all target systems without any adaptations required – irrespective of screen resolution, operating system or web browser. Refresh rates and response times eclipse all previous experiences with web applications and surpass even conventional operator



▲ The atvisewebMI HMI solution enables you to keep your plant in view from any location

systems. A powerful JAVA script option is also provided for special requirements. The web solution also offers another benefit: Even where strict access rules, firewalls or other technical obstacles make access for the clients of conventional visualization and SCADA solutions difficult, access via a web browser is usually possible.

» *The scalability of the atvise® product considerably reduces the effort required by the user.*



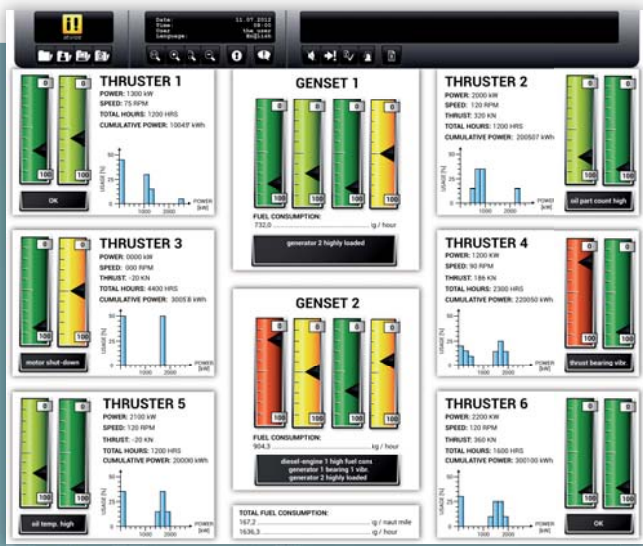
Ronald Düker
Responsible for product marketing
at Certec

OPEN ENGINEERING THROUGHOUT

atvise® is the first SCADA product that is completely built on the open industrial standard of OPC Unified Architecture (UA). It focuses particularly here on enabling vertical, seamless and object-oriented engineering. Suitable OPC UA object types are thus produced, for example, from function block declarations in the PLC, and corresponding OPC UA objects are created from the function block instances. This has a decisive advantage: A PLC program is always implemented with the same object structure in the address area, irrespective of which PLC it is to run on and by which OPC UA server the data is to be accessed.

This means in practice that an OPC UA compliant HMI or SCADA system like atvise® can accept the PLC objects without any additional engineering, so that several previously required operations become unnecessary. The times of data point lists having to be kept in duplicate, and time-consuming and error prone export/import processes are over.

This kind of implementation also reduces programming complexity, is more compact and therefore more readable, and also simplifies commissioning and maintenance. The



- ▲ **Application example of atvise®:**
HMI of the thruster control of a special ship

object-oriented engineering with atvise® has been OPC UA-compliant from the beginning so that modifications to object types are completed automatically in all instances. These objects are fully described in atvise® and contain all the properties such as alarming, historization, graphic representations (displays) etc.

STANDARD BROWSERS

"Strictly web compliant technologies belong to the future," Matthias Schagginger, R&D manager for tools & runtime at Bachmann is convinced. At the same time this guarantees the highest level of investment protection, since devices without a browser connection are hard to imagine any more. Today, even 20-year-old web pages can still be displayed with typical browsers. Even the problem of multi-lingual displays is no longer an issue since texts in Cyrillic or Chinese characters can be displayed in web browsers with exactly the same simplicity as with Roman characters. A complete rights concept for users and groups naturally also includes user-dependent language selection. Recognized security standards such as SSL encryption ensure that the relevant web server can be accessed with optimum security.

VERSATILE USE

Due to their generic structure, the atvise® HMI and SCADA solutions, conceived specially for the professional automation and process control technology, can also be used in all application areas and sectors, such as energy, plant and machine building, maritime applications, building services management, infrastructures or logistics. The modern and efficient structure enables the scalability

atvise®

- ▶ The latest SCADA / HMI system generation
- ▶ Client server architecture (multi-client)
- ▶ Operator interfaces in pure web technology (HTML5, SVG, Java Script)
- ▶ Device and operating system independent (PC/Mac/Unix, tablet, smartphone, iPad,...)
- ▶ Process connection via OPC UA
- ▶ Online engineering / multi-user enabled
- ▶ Integrated alarm system
- ▶ History database
- ▶ Online/offline trending
- ▶ Online language/font selection
- ▶ User management & access security

from very small applications with a few dozen information points up to commercial plant technology involving several 100,000 process variables. Here atvise® already supports standard functions such as alarm handling, historization, trending, user management and language selection.

BACHMANN AN INNOVATION LEADER

"With the growth of consumer products such as tablet PCs or smartphones, the demands placed on industrial visualization have noticeably increased," Ronald Düker, responsible for product marketing at Certec, explains. "These devices show that the use of graphics and multi-touch for the intuitive operation of even complex processes is very simple." The requirements in the automation sector are likewise changing. "In future, the performance of the hardware will no longer be the sole differentiation criteria, but also the added value provided by the visualization," Ronald Düker is convinced. "In this respect we are also one step ahead, thanks to our cooperation with Certec," Matthias Schagginger is delighted. By merging the M1 automation system with atvise®, Bachmann is pointing the way in the automation sector. ■

INNOVATION THROUGH COLLABORATION

Bakker Sliedrecht and Bachmann
electronic develop fast redundant
control systems



▲ The new Boskalis cable ship, the first time that the redundant Bachmann PLC is used.

The Bakker Sliedrecht (Netherlands) engineers and the software developers of Bachmann electronic have developed a fully redundant solution based on the Bachmann M1 PLC. The secondary CPU (slave) seamlessly takes over system control from the primary master CPU within one cycle. Furthermore, all data for the higher-level BIMAC alarm and SCADA system is available within 50 milliseconds. The next expansion stage is already planned: The first concepts for the development of a real-time update in less than <20 milliseconds already exist.



Bakker Sliedrecht Electro Industrie B.V. is a supplier of electrical engineering solutions for the maritime and industrial sectors. The company specializes in consulting, planning and developing complex plants and their subsystems, and also carries out maintenance, technical acceptance and repair work. Founded in 1919, the company is headquartered in Sliedrecht, the Netherlands.

The reason behind the development of this fast redundant control system was the technical planning of the Boskalis cable ship. Bakker Sliedrecht has already had similar assignments several times before. However, this time they faced a new challenge: the design of a redundant control system for the power supply system, based on standard components, suitable for standard Ethernet and with sufficiently fast cycle times.

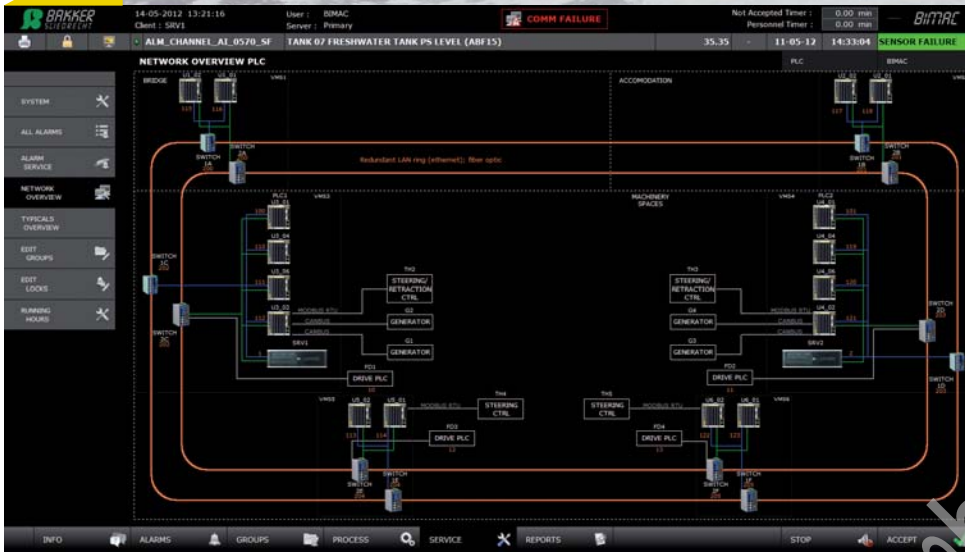
MAXIMUM RELIABILITY REQUIRED

The challenge was to create a redundant Bachmann automation solution. Why, however, was this so important for Bakker Sliedrecht? Anthon Knoops, head of engineering, explained: "Our customer requires the highest possible reliability for the control of the diesel-electrical drive system. This cable ship has four diesel generator sets that provide a combined power of 7000 kW. These power and control the four azimuth thrusters and multiple mooring and anchor winches via four directly water-cooled drives from Bakker. Furthermore, with the dynamic positioning system, they ensure that the cable ship is brought to the exact position required and is also kept there." After all, stringent requirements are placed on the accuracy of cable laying on the ocean floors. Interruptions in the power supply are therefore absolutely impermissible since they can result in an interruption of the entire offshore operation and must therefore be prevented at all costs. This has thus resulted in the need for a redundant control and monitoring system. "Since we have already been working with Bachmann controllers

The network is fully redundant – despite the fact that only standard components have been used. This is vitally important for maritime applications.

Anthon Knoops

Automation engineer
at Bakker Sliedrecht



◀ Overview of the cable ship's onboard network

▶ Anthon Knoops and Sander Doolaage, automation engineers at Bakker Sliedrecht

for approximately four years, we contacted them for a solution,” Anthon Knoops explained. “Since they work with standard Ethernet and use no dedicated control systems, their PLCs are perfectly suited for our applications,” Knoops continued.

REDUNDANT NETWORK STRUCTURE

The networks on board of the cable ship consist of a standard Ethernet configuration that is laid out as a double ring of fiber optic cable. The various devices are connected to this double ring – including the remote IO modules and drives. The protocol used is Bluecom, Bachmann’s Ethernet protocol. All network devices can be connected to this without any additional effort. “The network is fully redundant – despite the fact that only standard components have been used,” Anthon Knoops explains. A key decision factor for Bakker was the fact that Bachmann control systems are approved by agencies such as DNV, Lloyds and Bureau Veritas: “This is vitally important for maritime applications,” Knoops elaborates.

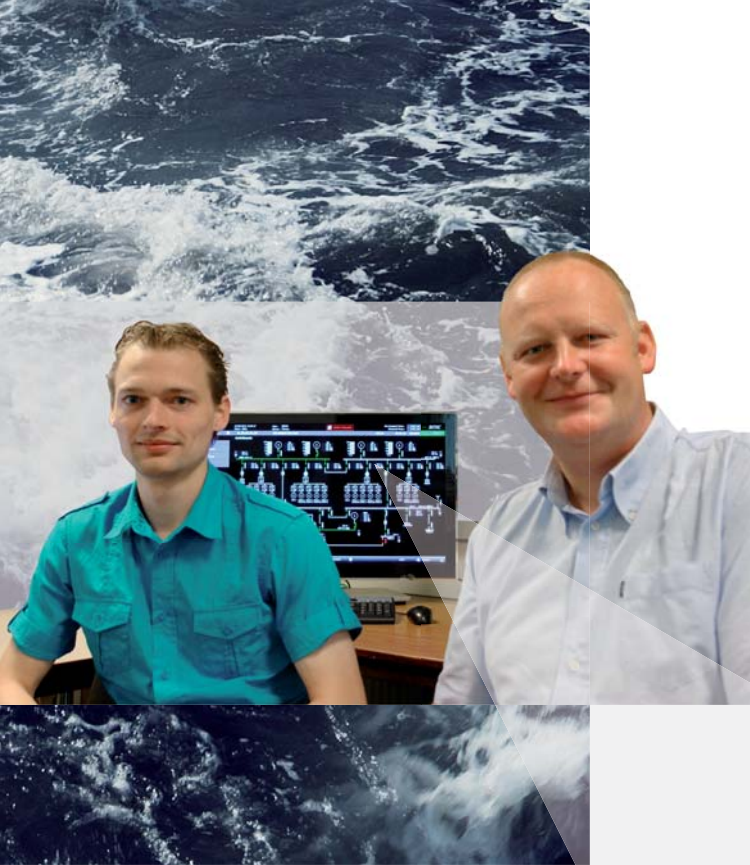
REAL-TIME PROTOCOL ENABLES CPU COUPLING

“The people at Bachmann responded to our requirements with a positive interest. At the beginning of 2010 we started to work with

them on the development of the redundant control system in a very relaxed and open collaboration,” Anthon Knoops recalls. Both controllers run with the same program and are synchronized with each other. If one of the CPUs is stopped, the other CPU takes over the program within one PLC cycle. “We know from experiments that all tasks are executed without any errors,” Anthon Knoops confirms. “The system as a whole is being tested in a Super Factory Acceptance Test at Bakker Sliedrecht.”

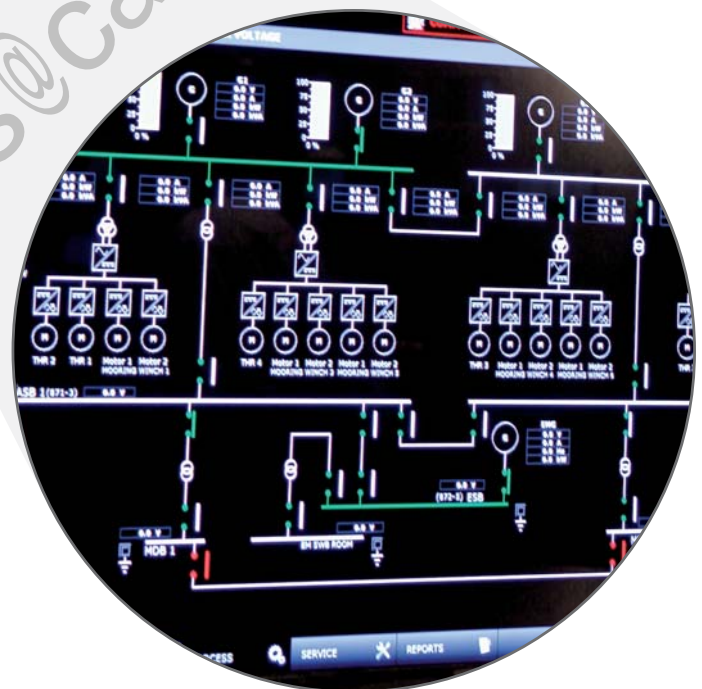
FIRST-CLASS PRODUCTS THROUGH COLLABORATION AT THE HIGHEST LEVEL

Sander Doolaage, automation engineer at Bakker Sliedrecht is delighted: “This redundant control system really is unique. Bakker Sliedrecht is the first company to use this control system in a project.” The redundant control system is combined with the BIMAC alarm and SCADA system from Bakker. “We have also developed the necessary drivers for this. The result has been very successful. We have now reached a point where we only have to take care of some minor adjustments,” Sander Doolaage says. “This is, of course, only possible thanks to the excellent collaboration between the people of our company and the Bachmann team. The Bachmann engineers are good listeners: They give us the opportunity to



The Bachmann engineers are good listeners: They give us the opportunity to explain and specify our requirements fully. They then swiftly implemented our suggestions and ideas.

explain and specify our requirements fully. They then swiftly implemented our suggestions and ideas." The partnership particularly benefited from the direct and personal contact between the engineers at Bakker and the software developers at Bachmann. "We are growing together and are thus able to meet even major challenges," Sander Doolaeye summarizes. This means that both sides benefit from the results of their collaboration. ■



- ▲ Visualization of the power supply system, Bakker Sliedrecht's BIMAC system. The four generators which ensure power for the thrusters and the anchor and mooring winches are shown in a redundant configuration.

TELECONTROL PROTOCOL MADE TO MEASURE

The IEC60870-5-104 telecontrol protocol is widely used in the power station, energy distribution and infrastructure sector. It allows the control and monitoring of intelligent subcomponents and substations with a higher-level control station. These subcomponents range from circuit-breakers, inverters and energy meters, to CHP units, right through to complete power stations.

The optional IEC60870-5-104 server software component adds this multi-vendor interface to the M1 controller system. Each client that is compliant with the standard can thus read and write access selected process variables of the controller application via the TCP/IP network.

60870-5-104 IN BRIEF

The data is exchanged via a TCP/IP network. The server contains a data model in the form of a flat list of individual data points. The data consists of so-called information objects. The client connects to the server and transmits a general interrogation. It receives in response the actual value of all information objects. The server then monitors the values independently and transfers this automatically to the client in the event of a change. The client can also write access some information objects to the controller.

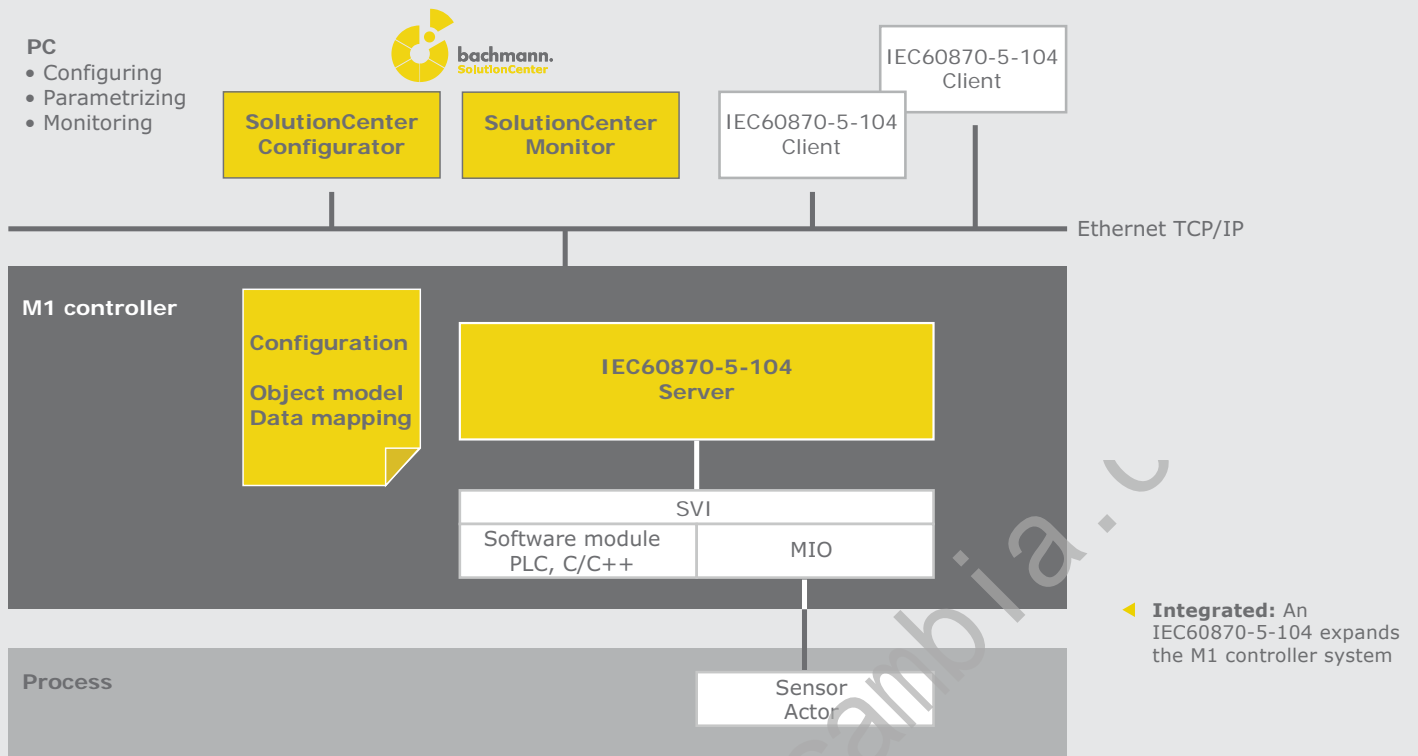
The standard defines a number of telegram types such as single indications/single commands for Boolean values, double indications/double commands for circuit-breakers with two monitoring contacts

(breaker open, breaker closed) or measured value/setpoint as a decimal value. Measured values can also be scaled or normalized. Each information object is assigned quality information and also with a time stamp, depending on type.

The standard defines over 100 types, although far fewer are used in real applications. The manufacturer states the telegram types that are available in an interoperability list that is also standardized.

IMPLEMENTATION FOR THE M1 CONTROLLER

The server is installed on the controller as an additional software module. The software for sequence control and closed-loop control does not have to be changed and is not affected in its runtime. This therefore allows the same unit to be equipped as required with an interface from the portfolio of the telecontrol components (IEC61580, IEC61400-25, OPC DA, OPC UA, Modbus, ...) without the need to repeat thorough testing, thus enabling a flexible response to the requirements of the end customer.



The selection of process variables that are visible to the outside, i.e. the information model of the server, is implemented via a configuration file in which the information objects are defined and associated with SVI variables. In order to reduce the data rate, a threshold filter function can be connected upstream for each information object, and min./max. values can be set in order to define a valid range.

The server is integrated in the security concept of the M1, with all write accesses of the client listed in the security protocol of the controller so that the person executing commands or setpoint changes and the time of the execution can be identified later. If required, it can be specified that only one client with a predefined IP address can be used to establish a connection.

TOOL SUPPORT

The Device Manager provides the server software with a user-friendly configuration tool for creating this configuration and for connecting the information objects with the SVI variables. Plausibility checks are run already at the input stage, since not every variable type can be mapped logically to every type of information

object. The configuration can be exported and imported directly from the Device Manager via a CSV format so that it can be exchanged simply with other manufacturers.

The Device Manager also features a monitor that displays the last value transferred for every information object and its time stamp. In the event of any transmission problems, simple diagnostics can thus determine whether a client is connected, a general interrogation was executed, and which values were marked as invalid for the client. ■

The background of the entire page is a close-up, top-down view of numerous blue PET bottles. The bottles are arranged in a dense, overlapping pattern, with their circular openings and textured surfaces clearly visible. The lighting is bright, creating highlights and shadows that emphasize the three-dimensional shape of the bottles.

INTELLIGENT COATING

Bottles as impermeable as glass,
as light and flexible as PET

They are not a hundred percent gas-tight, which negatively affects the lifespan and quality of the filled product. Any exchange between the contents and the bottle material itself is also possible and must therefore be avoided. The interior coating of PET bottles with a wafer-thin glass layer is one solution for both problems. With InnoPET plasmax barrier coating, a wafer-thin silicon oxide layer of pure glass is applied to the complete interior of PET bottles. This reliably prevents the exchange of substances such as carbon dioxide, oxygen, water, aromas or also coloring between the product on the one hand and the packaging and environment on the other. One benefit of the InnoPET Plasmax process, which is very highly valued on the market compared to all other available barrier technologies, is the fact that the PET bottles coated with glass can be fully processed in established recycling processes without any restriction.

KHS Plasmax GmbH is a company based in Hamburg that offers solutions for technologically innovative and high quality coating systems for the food and beverage industry. The InnoPET Plasmax 20Q is a new system in the range and can provide a wafer-thin glass coating on up to 40,000 bottles per hour.

RELIABLY SEALED

The bottle coating machine is directly integrated in the production and filling process. At the input, the bottles are individually turned in the turning device with the opening pointing downwards. Then every four bottles are fed to a vacuum chamber in the coating wheel. During the rotation a vacuum is first created in the chamber inside and outside the bottles. A reaction gas mixture is then introduced into the bottles, which is then brought into an energy rich plasma state by means of microwaves and thus reacts. This forms into silicon oxide which precipitates evenly on the entire interior surface of the bottle, thus producing an invisible and impermeable protection layer.

The transportation of the bottles, the introduction of the gas, the activation of the microwaves and the monitoring of the coating process are controlled with PLC systems from Bachmann electronic GmbH. In all, 26 controllers are used in the plant, an MPC270 as a central main controller for creating recipes, monitoring alarms and similar messages. An MX213 is used to regulate the gas generator. Three additional controllers of this type work on the vacuum pumping station. Furthermore, 21 MX213 controllers on the coating wheel bring the intelligence to exactly where it is needed. A higher-level controller supplies 20 secondary controllers, one for each vacuum chamber, with the necessary information via a loop. A modular software concept enables all station modules to always have the same structure. The software just has to be adapted to the particular machine type. The controllers of the vacuum chambers control the generation of the vacuum, the introduction of the reaction gas, the activation of the microwaves, and the measuring of the light flash produced during the reaction.

The controller experts have also developed a module for the project that monitors the ignition of the reaction mixture after a specified pulse sequence and thus the reliable coating of the bottle. The intensity of the light flash present during the reaction is measured, and the feedback in response to the pulse sequence is read back at the same time. This provides the information required to ensure reliable coating. After the reaction, the bottles are



KHS Plasmax GmbH specializes in the manufacture of machines for barrier coating of plastic bottles. The company is based in Hamburg and is part of the KHS Group, an international manufacturer of filling and packaging plants for the beverage, food and non-food industries. In conjunction with the other companies of the group, the entire line know-how is available for complete systems in the bottling sector.

taken from the vacuum chamber, and good samples are automatically transported on to the filling plant. Bottles with insufficient coating are ejected.

OPERATION WITH A FEW PUSHES OF A BUTTON

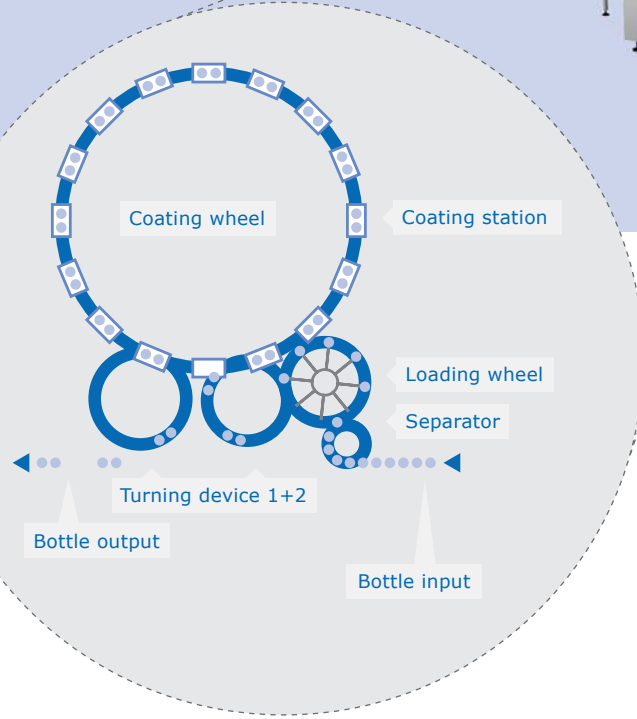
The coating machine is integrated in the overall production process. The OMAC standard (Open Modular Architecture Controls) is used to ensure reliable communication with other plant sections. The aim of this standard is the unambiguous definition of open and modular automation architectures.

Once the recipes are initially stored in the controller, the machine can be operated with only three buttons – based on a well thought-out status model. The machine is switched from the “off” state via the “up” button to the “stopped” state, in which the heaters and gas generator are switched on. Only when this state is reached can the user then switch via the “up” button to “starting” mode, in which the pumps are switched on and the gas generator is powered up. This continues in further steps until the “production” status has been reached and production is started. In each state, the “down” button can be used to manually return to a safe mode, or in the event of a serious fault, the plant automatically activates an emergency-stop. This allows the machine also to be operated simply and safely even by untrained personnel.

HIGH SPEED AS A STANDARD

The plant described is a successor to the smaller sister model, the InnoPETPlasmax 12D, which enables the coating of 12,000 bottles per hour. “For the new development, our customer placed great importance on the ability to adapt the software in future according to

- ▶ **A controller is used for each station** for generating the vacuum, introducing the reaction mixture, activating the microwaves and measuring the light flash which is produced during the reaction



» 26 controllers are networked via Profinet as standard. This also simplifies operation and maintenance.

Frank Zdrallek
Application engineer at Bachmann electronic

changing conditions," Frank Zdrallek, application engineer at Bachmann electronic, explains. "With the old machine this was not possible. For this reason, we worked closely with KHS in the development of the software, so that their employees could become familiar with the software code and understand it in order to carry out their own developments in the future." The new solution also provides an additional benefit: Whilst several components were required with the old machine in order to measure the light pulse, this is now implemented in a single module specially designed for the application. This in turn means fewer interfaces, fewer components used, a reduced number of parts and consequently fewer potential error sources.

Whilst different communication buses were used before, the new solution now uses Profinet as standard. This also simplifies operation and

maintenance. In the new solution, not only the duration of the light pulse but also its intensity is measured at the same time. This provides more reliable information about the quality of the coating. The user was ultimately impressed by the speed of the controllers used. For the specific application, reaction times of 50 μ s could be achieved with the standard hardware. It was therefore ensured that the packaging process could keep pace with the high speed of the production process. ■

REDUCED COMPLEXITY À LA BACHMANN

Simplified programming of multi-tasking applications

The tasks required in the field of automation are becoming increasingly more complex and time critical. In the new version 3.35 of M-PLC, Bachmann uses an even more efficient multi-tasking programming and thus helps to further reduce development costs.

For years, the breaking down of complex applications into individual software modules has been a successful process on the M1. This module-oriented approach has allowed clear and easy to understand blocks to be created. These modules are programmed, tested and compiled individually. They can then be used and configured in the project once or several times. These modules are mapped as individual operating system tasks and communicate with each other via a standard complex interface.

With M-PLC version 3.35, the programming of multi-tasking applications is even more convenient, since it is hardly different from single-task programming.

SIMPLE AND EFFICIENT MULTI-TASKING PROGRAMMING

Up to 16 independent tasks can be defined in an IEC61131 project. Each one can be configured selectively in the development environment in terms of priority, run mode and trigger condition. Each task can be assigned any number of (sub)programs that exchange their data via global variables. The full range of proven tools from the M-PLC and the SolutionCenter are available for programming and debugging.

GREATER FLEXIBILITY

In the new version, the handling of the data that is only produced during the runtime of the program was optimized. This information (retain data) must also be retained during voltage failure or downtimes. In standard systems a static memory layout is used for this. Expansions and changes then unavoidably lead to a data loss. In the new version of M-PLC, non-volatile data areas are reconfigured automatically. The user is also supported by diagnostics tools.

MORE FREEDOM IN DEVELOPMENT

The skillful use of multi-tasking and data exchange in programming simplifies the development process. The uncomplicated handling of non-volatile data ensures greater freedom for process optimization in the PLC software. The M-PLC 3.35 from Bachmann thus reduces development times and the resulting costs. ■

ONE FOR ALL – AND ALL IN ONE

Analog and/or digital – universal I/O module for all applications

With the new GIO212, Bachmann electronic is presenting a highly flexible I/O module: Each of the 12 channels can be configured either as a digital or an analog input or output. The module can therefore be used for a number of applications and is suitable for use with a wide range of sensors and actuators.

Input/output modules collect the signals of an installation and condition these for further processing in the machine controls. Today several different types of modules are therefore required due to the wide range of different signals used. If only a few external signals are incorporated, for example with small installations, it is seldom possible to achieve the optimum design of the automation solution: Most modules are assigned with considerably fewer signals than their capacity allows. This increases costs, the space needed in the control cabinet, and also increases the effort involved in managing spare parts, due to the different modules required.

FREELY CONFIGURABLE CHANNELS

Bachmann has solved this dilemma with the GIO212: All channels of the universal I/O module can either be configured as analog or digital inputs or outputs, as counters or inputs for temperature and resistance measuring. Depending on the function selected, a

channel can be assigned up to two functions (mixed mode operation). All the standard I/O functions used in an automation solution have thus been provided for the first time in a single module.

MANY SPECIAL FEATURES

The digital inputs can be operated as type 1, 2 and 3 to DIN61131-2 (sink) or as source inputs. The digital outputs also come with a special feature: Each channel provides an output current of 100 mA and can also be configured as a push-pull driver, in addition to the ground or positive switching. They can also be used for pulse width modulation, for which the period duration and pulse width of the PWM can be set separately. The integrated counters (twelve with one counter signal and six with an A/B track) have a 32-bit resolution.

FOR ANY APPLICATION AND ENVIRONMENT

The analog voltage and current inputs stand out on account of their wide and highly graduated measuring range. Thermocouples of all standards or sensors with a 24V supply can be connected and operated on each of the twelve channels. These channels can likewise be used as a temperature input for Pt100/Pt1000 in 2, 3 or 4-wire measuring circuits. In all, six channels are available for the use of sensors with a 0 to 10 V supply and for strain gauge measuring with 4 and 6-wire circuits. Extensive input parameter and filtering options enable them to be adapted perfectly to any application and automation environment.

PERFECT INTEGRATION

The GIO212 is configured and parameterized in the Bachmann SolutionCenter. The configured channel types of the I/O module are displayed here, and a suitable descriptive text can also be given to each channel. The values and limit values, as well as appropriate warning dialogs guide the technician and ensure that commissioning is completed as safely and as reliably as possible. Another special feature is the fact that the user can store the connected sensors with configuration, wiring diagram and complete data sheet in the SolutionCenter. This reduces the configuration effort for new installations whilst ensuring at the same time that always the same settings are used.

THE "SWISS ARMY KNIFE"

The GIO212 from Bachmann electronic impressively offers a functionality that was previously unavailable for I/O modules. The benefit of this universal module is outstanding: Low wiring and space requirement in the control cabinet, less expense, and only one spare part that has to be managed. ■

»With the GIO212, Bachmann is solving a dilemma: All channels of the universal I/O module can either be configured as analog or digital inputs or outputs, as counters or inputs for temperature and resistance measuring.«

GIO212

CHANNELS: 12

- Primary, freely configurable
- Plus max. 12 secondary

INPUTS: 12

- Freely configurable as digital input
- Single mode counter (Dual mode: 6)
- Voltage input, current input
- Connection for thermocouples

OUTPUTS: 12

- Freely configurable as digital output (with/without PWM)
- Voltage output
- Current output

INPUTS AND OUTPUTS: 12

- Freely configurable as temperature input
- Pt100/Pt1000
- Resistance measuring / PTC / NTC
- Sensor input with 24 V supply
- Sensor input with 0...10 V supply
- Strain gauge: 6

COMPLETE TRUST

WestWind relies on Bachmann Condition Monitoring – as a matter of conviction

WestWind is one Germany's leading full-service providers for the development of projects in the wind energy sector. The company's portfolio ranges from the design of wind farms to the operational management of its own plants or those of third parties. **realtimes** spoke to Jens Rösler, head of technical operational management at WestWind, about Bachmann's involvement and about friendships.



Founded in 1998, WestWind energy is one of Germany's leading full-service providers for wind energy projects. The service ranges from the detailed planning of wind farms, to financing and building supervision, right through to the technical and commercial operational management of wind farms. Based in Kirchdorf in North Germany, the company has around 25 employees.

realtimes: *Why do you use a condition monitoring system (CMS)?*

► **Jens Rösler:** CMS allows us to ensure the early detection of damage in order to prevent the avoidable occurrence of major damage and to optimize the planning of repairs. We try, for example, to move any repairs when possible to the times of weak winds between May and August.

The early detection of so-called wear damage, particularly to the bearings of major components on the drive train, and the resulting plannable replacement of components without any major downtimes, ensure the high energy availability of the wind power plants even when damage occurs. Reduced insurance premiums are another attractive spin-off of the use of CMS.

realtimes: *Why did you choose the CMS solution from Bachmann?*

► **Jens Rösler:** The innovative and future-proof concept greatly impressed us. Already at our first contact, we noticed that the Bachmann employees are absolutely professional in their work, and are not satisfied with their success to date, but always stay on the ball in order to keep up with the current state of the art.

The price and the full-service monitoring offered also impressed us. The entire concept matches the philosophy at WestWind superbly. Since 2009, all plants with gears are equipped with the Bachmann CMS and we are fully satisfied with it.



We are completely satisfied with the Bachmann CMS.

Jens Rösler

Head of technical operational management at WestWind



realtimes: *Where do you use the Bachmann system?*

► **Jens Rösler:** All wind power plants with gears belonging to the operational management at WestWind are always monitored by Bachmann Monitoring. This includes an NM 60/1000 (NEG Micon), two AN 1300s (AN Bonus) and seven GE 1.5sl turbines. These are specifically the Marklohe/Wohlenhausen, Wagenfeld, Frestorf, Frestorf-West and Haustedt wind farms (all in Germany).

realtimes: *What have been the specific benefits of the Bachmann system so far?*

► **Jens Rösler:** In the past we had a lot of main bearing damage on the GE installations, faulty generator bearings and two occurrences of damage to gears. One of these occurrences could be repaired on the installation thanks to early detection.

At present we have generator bearing damage on a GE 1.5sl. In the planned repair, it was possible to also replace the partly damaged slip ring. During the repair it was also discovered that a bearing shield was damaged. The costs for this are around 15,000 euros. In the worst case, the generator could have become a total write-off if there had not been the permanent online monitoring provided by Bachmann Monitoring in Rudolstadt (Germany). Furthermore, this could have occurred in autumn and winter when the best wind conditions are present. The resulting damage, including the loss of yield, would then easily be 10 times as expensive as the repair carried out now.

realtimes: *What is the daily handling with the system like?*

► **Jens Rösler:** As we have a contract for full-service monitoring with all installations and have had very good experience with it, we just have to log into WebLog for control purposes. We receive a great deal of support from Bachmann and have a great deal of trust in the experienced Bachmann technicians that daily monitor the measured values. We are always notified of any abnormalities. We also find the regular customer training courses very valuable.

The collaboration is simply excellent. It is open and based on trust, in fact one can honestly say that some real friendships have developed from it.

We urgently recommend all our existing and naturally also future customers of wind power plants with gears to have their installations monitored with the Bachmann system.

We are looking forward to more innovative ideas from Bachmann that will help to further increase the availability of our wind power plants.

realtimes: *Many thanks for this interview.* ■



ECS200 – ETHERCAT SLAVE MODULE

*Simple solution for creating
highly functional subsystems*

EtherCAT®

The ECS200 EtherCAT slave module enables M1 controllers to be connected as slaves to a higher-level EtherCAT network. This is used when the M1 is used to control an autonomous and intelligent subsection of a plant or machine.

The actual connection status of the slave to the EtherCAT master is indicated in the program via a variable. In this way, the slave can run any programmable response to a network interruption. The MIO, SVI interfaces and the process image give the M1 application programs complete access to all incoming and outgoing cyclical process data. They can also be synchronized with the external EtherCAT bus. In this way, the applications also run independently in the same interval in the event of a network fault.

The ECS200 is configured in the Bachmann SolutionCenter. This enables the number, size and direction of the process data units transferred via the EtherCAT bus to be defined and passed on to the master as an ESI file. As the M1 controller represents a "module device" with a static object dictionary, any further configuration is unnecessary. The LEDs on the two EtherCAT ports simplify any diagnostics required in the field.

The ECS200 enables an autonomous and intelligent subsystem to be implemented very easily with a connection to an EtherCAT network. ■



LOAD DETECTED – DANGER AVERTED

*Monitoring the mechanical structure
of a wind power plant*



The new SVM300 structural vibration monitor from Bachmann electronic enables the measuring and recording of loads on the mechanical structure of a plant. The SVM300 has a modular design and can be expanded for a wide range of condition monitoring applications. The comprehensive range of functions guarantees the efficient and safe operation of the monitored plant.

The SVM300 detects accelerations on the tower and nacelle of a wind power plant in up to three axes, and thus provides valuable information about any loads occurring over the entire lifespan of the plant. The sensor also supplies a continuous data stream to a condition monitoring system: Any creep damage, caused for example by unbalance, can be detected early on, so that repairs can be scheduled accordingly.

At the same time, the vibration analysis enables a wind power plant to be optimally adjusted to environmental conditions: This therefore enables the efficiency of the plant and its lifespan to be increased. The SVM300 can be used as a 'black box', since the data is stored with an autonomous power supply and logging continues even in the event of a mains failure. Besides its use in wind power plants, the SVM300 also has a wide range of applications in machine building and on ships.

APPLICATION: STRUCTURAL HEALTH MONITORING

The measured data of the SVM300 enables the lifespan models of a wind power plant to be represented more accurately. The measuring module is already mounted on the tower for structural health monitoring when the plant is erected, is manually or automatically activated, and can be provided with an optional battery supply. Vibration and oscillation loads on the structure can thus already be recorded during construction.

When the WTGS is commissioned, the SVM300 is integrated simply in the Bachmann CMS system and the data already logged is automatically synchronized with the PLC. The continuous logging of the acceleration values and their evaluation enables more accurate conclusions to be made about the remaining lifespan of a plant. For structures operating offshore, this is particularly attractive.

COMPLETE INTEGRATION IN BACHMANN AUTOMATION

The SVM300 allows new diagnostics and monitoring functions to be integrated very easily in the Bachmann M1 system. With this structural health monitoring system, Bachmann is also setting new standards in the optimization of the life cycle costs of a wind power plant. ■

◀ **SVM 300 sensor:** Records vibration loads on the tower structure already during plant construction.



USA – PERFORMANCE FOR BACHMANN CMS

Bachmann Emphasizes Its Expertise With Condition Monitoring For Wind Power Plants

Whilst there are many operators of wind power plants (WTGS) in Europe, large-scale wind farms in the USA are only in the hands of a few. Up to now condition monitoring systems (CMS) have seldom been used in North America. However, the interest in CMS is continually growing, as the operating and maintenance costs of wind power plants increase the older they get. With its easy-to-retrofit CM solution that is integrated in the control system, Bachmann electronic is playing to its strengths. The extensive know-how of the company is based on over ten years of experience in the monitoring of wind power plants.



Several different technologies such as vibration measurement, oil analysis or endoscopic examinations on the plant come under the term 'condition monitoring'. The most widely used technique is the measurement of vibrations. Selected components of the WTGS – normally the main bearings, the gears and the generator – are monitored with special acceleration sensors. Components which show signs of degradation produce a specific frequency pattern. These are evaluated in the CMS and give an indication of the extent of the damage. In this way, the operator is provided with an instrument by which he can carry out selective and planned maintenance operations. This process is very cost effective and has therefore been used for decades in several industrial sectors. "Many companies are now entering the market in the USA for condition monitoring systems in wind power plants," David Clark, sales manager for wind at the Bachmann electronic Corporation (USA), explains. The application of concepts from other industrial sectors to wind power plants is limited. "Bachmann, on the other hand, has more than ten years' experience in the wind energy sector," Clark adds.

BENEFIT: CONTROLLER INTEGRATED CMS

A Bachmann M1 automation solution is in use in more than half of all wind power plants worldwide. The retrofitting these plants couldn't be simpler with the PLC-integrated CM solution from Bachmann electronic, which has already been GL certified. The benefits of an integrated CMS are obvious: The system uses the power supply and communication network of the PLC. Additional components are unnecessary, thus reducing costs and enabling a greater system overview.

The installation of the Bachmann CMS normally requires one AIC212 module and six vibration sensors. The PLC itself should be equipped with a series MPC240 processor module. Only the components for cabling are additionally

required. This therefore makes the installation of the CMS hardware in new and already existing wind power plants very simple: "Compared to CMS systems that are not integrated in the PLC, the Bachmann solution is also very cost efficient as only a few components are needed," Clark stresses. Naturally it can also be installed in wind power plants that are not controlled by a Bachmann M1 system. "Depending on the type, an integrated installation is just as possible here as a stand-alone solution," David Clark adds.

COSTS UNDER CONTROL

CMS benefits the manufacturers of wind power plants as much as their operators. For the first group, these benefits occur during the standard 2-year warranty period, and for the second group, over the entire lifespan of the plant. "Up to now very few plants come with a factory fitted condition monitoring system," Clark explains. However, this practice is changing. "When the increasing age of a wind power plant is taken into account, let alone the high operating and maintenance costs, the optimization of plant availability and its yield are increasingly becoming a priority in the USA," David Clark states. Added to this, Clark explains, is the increase in the number of plant owners who have to pay for repair costs themselves as manufacturer warranties elapse.

BACHMANN: HARDWARE, SOFTWARE AND EXPERTISE

Besides the extensive hardware, Bachmann can also offer user-friendly software. Weblog enables the operator to keep an eye on all wind power plants: "Another key benefit of the Bachmann solution," David Clark says, "since the average wind farm in the USA has between 60 and 80 turbines. This requires excellent data management in order to be able quickly match any damage with the relevant plant." Any faults occurring are automatically logged in Weblog and an appropriate report is sent. This can be evaluated immediately by trained experts at the Bachmann Monitoring Center. At present this monitors more than 1,800 wind power plants from 20 different manufacturers.

David Clark, Bachmann USA



Depending on the type, an integrated installation is just as possible here as a stand-alone solution.

"A critical factor in the evaluation of a fault is the experience of the specialists – experience that we have gained from over 10 years of continuously monitoring a large number of wind power plants," David Clark explains the edge of Bachmann in terms of expertise. "Bachmann has a range of powerful hardware and software components in combination with extensive expert knowledge – a package that is made fully available to all operators of wind power plants." ■

PREMIERE IN THE CONDITION MONITORING WORLD

PLC-integrated CMS from Bachmann electronic is certified as the first system of its kind worldwide



Germanischer Lloyd has certified the "Ω-Guard" condition monitoring system (CMS) of Bachmann electronic as the world's first PLC-integrated solution. The implemented solution makes it possible for the first time to execute the entire logging, analysis and evaluation whilst the PLC program is running.

The AIC212 CMS module from Bachmann offers high-resolution vibration measuring inputs for the signal correlation detection of different measuring points.

At present the Bachmann CMS application enables up to four AIC212 modules to be integrated in the analysis. These offer 48 channels for vibration and voltage inputs. Data from the PLC or via fieldbus protocols from other sources can be logged and included in the analysis at the same time as the acceleration signals.

OTHER MONITORING FUNCTIONS WITHOUT DOUBLING THE SENSORS

The integration in the M1 system means that any signals and variables from the entire control system, such as the actual power or the

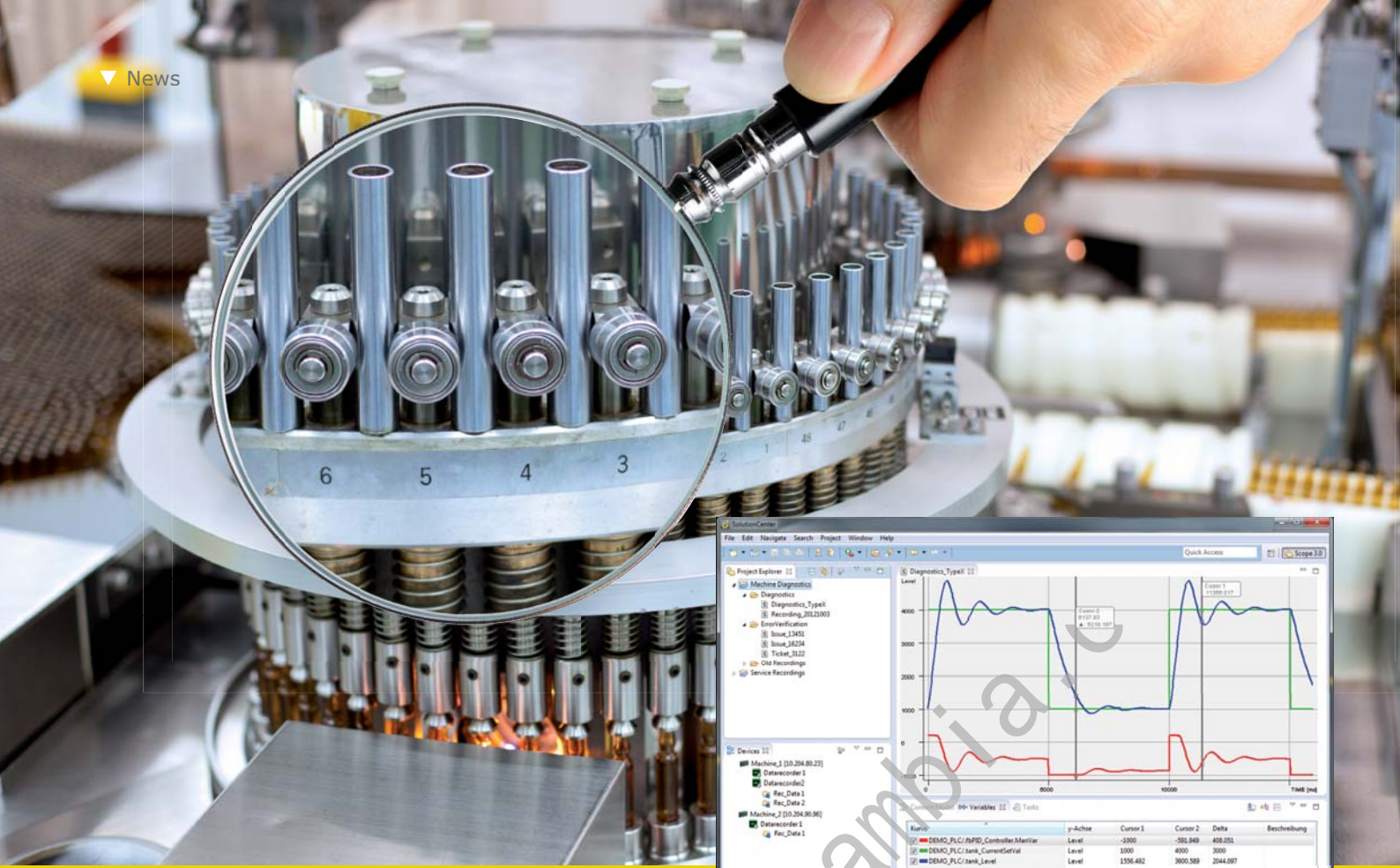
operating state, can be included in the evaluation without the need to double the sensors. In this way, other functions for monitoring the structure and rotor blade can be integrated in the CMS and the PLC, which is a clear benefit of the solution.

All the system components used for condition monitoring including the service of the online remote monitoring center of Bachmann Monitoring are certified in accordance with the regulations of Germanischer Lloyd.

The complete CMS functionality can be integrated in both new and existing controllers with a minimum of additional hardware. The "Ω-Guard" system remains an autonomous stand-alone CM solution. ■

- ▼ **First worldwide certified solution:** The AIC212 module is fully integrated in the Bachmann M1 automation system.





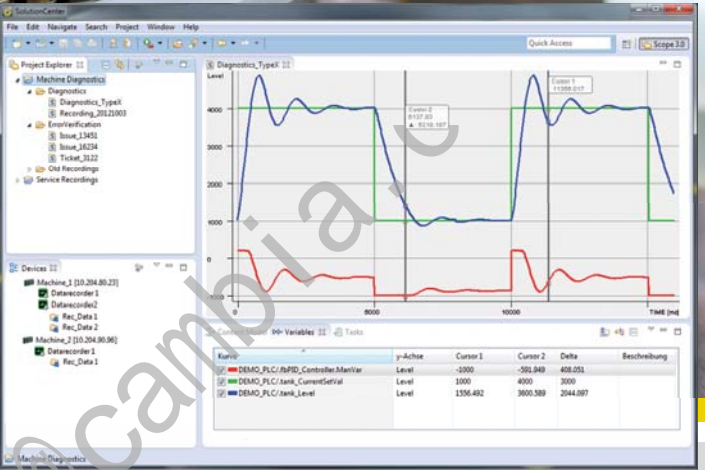
EXCELLENT RECORDING

*More efficient engineering
with the new Scope*



The Bachmann SolutionCenter meets all the requirements of the automation technician in the engineering process. With a user interface that is adapted to all individual requirements, the technician is equipped with highly efficient tools that simplify work and thus help to save time and money. Bachmann's new software oscilloscope offers an even more efficient tool that helps the user one decisive step further in the diagnosis and analysis of his automation project.

The commissioning, system optimization and all stages right through to the regular operation of a plant require the reliable and transparent recording of data. The extended software oscilloscope that Bachmann is presenting for the first time at the SPS/IPC/DRIVES 2012 fair in Nuremberg,



Germany, provides the user with a multi-functional analysis tool that eclipses all previous solutions. The many new functions, its ease of operation and its well thought-out solutions considerably simplify data analysis and troubleshooting. A new feature is the fact that several recordings can be carried out simultaneously with different scan intervals. The logged data is then archived if required in an integrated database system and is then available for further processing.

MARKET PLACE FOR PLUG-INS

The new Scope is available as a separate product, but can as usual also be incorporated in the SolutionCenter as a plug-in. It is therefore one of more than 1,400 useful extensions of the Bachmann engineering tool that are available to all users in the "market place". The SolutionCenter can also be expanded with its own functions with little effort. This therefore allows, for example, user-defined commissioning monitors to be created for personal applications or special configurations with customized workflows. In this way, the universal SolutionCenter becomes the individual tool for all cases. ■



▲ **A match for all weather:**
The Bachmann M1 controller
in the lightning protection
laboratory



DEHN + Söhne GmbH + Co.KG is a company based in Neumarkt in der Oberpfalz, Germany, and is renowned for its high quality products, proven solutions and extensive service in the field of surge protection, lightning protection / grounding and occupational safety. The company founded in 1910 now has over 1,500 employees worldwide and looks back on over 100 years of history, tradition and experience.

Broken rotor blades, shredded blades, burning nacelles – a lightning strike can cause a spectacular end to a wind power plant. Damage to the electronics, however, is far more frequent: These make up over 50 percent of all malfunctions in wind power plants and are therefore a key aspect with regard to the cost effectiveness of a plant. A lightning protection system can be installed to prevent serious damage, protect structures from fire or mechanical destruction and to ensure optimum safety for personnel.

INGENIOUS SYSTEMS FOR OPTIMUM PROTECTION

A lightning protection system consists of the air termination and down conductor equipment as well as a ground termination system and equipotential bonding. Every wind power plant is generally divided up into different lightning protection zones (LPZs): From LPZ0 in which a direct lightning strike is possible, to LPZ1, right through to LPZ2 in which most electronic components are located. The zone protection concept provides for suitable measures to effectively divert the energy caused by a lightning strike at the transition between two zones. In this way, the electronic system is ensured optimum protection.

FLYING SPARKS, MAXIMUM SAFETY

Bachmann M1 controller with optimum protection from lightning and surge voltages

The special structural features and exposed locations of wind power plants mean that lightning and surge voltage protection are always a critical issue. Modules are not infrequently sent back to the manufacturer for repair on account of suspected lightning damage. In a current project, Bachmann has been working intensively on this issue. The aim is to prevent in future long downtimes and high repair costs as a result of lightning strikes and surge voltages. Development teams are working on making the tried and tested M1 controller even more robust in order to also meet these special requirements.

LIGHTNING PROTECTION PROJECT WITH COMPETENT PARTNER

Bachmann is committed to taking on the challenges presented by its customers. Within the scope of the lightning protection project, it was determined how to install the Bachmann M1 controller in order to ensure optimum protection from lightning strikes and surge voltages. For this it was possible to engage DEHN + Söhne GmbH + Co.KG, the company based in Neumarkt in der Oberpfalz / Germany, as competent partners. The company has an extensive knowledge of external and internal lightning protection devices, and has gained experience in this field over several decades. "We thus not only had a contact for all questions relating to the lightning protection system, but were able to effectively develop surge voltage protection measures for our M1 controller," Lothar Lins, project manager at Bachmann electronic, expresses his delight.

EXTENSIVE TESTS IN THE SPECIAL LABORATORY

It was first of all necessary to describe the requirements for all components, such as the visualization, controller and sensors. "We used lightning protection zones as a guide and thus gained a good understanding of the processes present in a wind power plant when a lightning strike occurs," Lothar Lins explains.

DEHN + Söhne developed a concept for the optimum lightning protection installation of the Bachmann controller. "We then tested our installation in a gigantic lightning protection laboratory at DEHN + Söhne, in which a complete wind turbine with the different interfaces was simulated," the project manager at Bachmann electronic recalls. Surge currents up to 200 kA and voltages up to 100 kV can be generated in the test bays and test laboratory with different rise times and durations. "We were then able to derive the guidelines for the proper lightning protection installation of the Bachmann controller from the test results and thus also optimize them further," Lothar Lins summarizes.

Bachmann customers will also benefit from this project: They now have at their disposal a great deal of knowledge about lightning protection measures – optimized and applied to the M1 controller system. Protracted and costly downtimes as a result of lightning damage and surge voltage are thus now a thing of the past. ■

GOOD TO KNOW

The benefits of normative standards

In a research survey of 700 companies in German speaking countries, the Fraunhofer Institute for Systems and Innovation Research and the Technical University of Dresden examined the benefits of standardization work and normative systems. The results show that standardization is important. Bachmann electronic is active in many fields including the wind power sector. The IEC 61400-26 standard provides guidelines that cover all aspects of wind power plants and wind farms. The clear definition of the terminology in particular will lead to changes here: This will make it possible to make a better comparison of wind power plants and for all involved to speak the same language in the decision making process for the first time.



The IEC is an international standards organization with headquarters in Geneva, Switzerland. Its regulations cover the fields of electrical engineering and electronics. International normative works and standards are developed in different committees. The individual members represent the relevant national interests of the electrical engineering sector. These include representatives from a wide range of areas, such as manufacturers, energy suppliers and consumers, as well as government bodies, professional bodies and trade associations. Around 90 percent of those involved in the development of standards in the IEC work in the industry.



>> ***The benefits of the IEC 61400-26 standard for wind turbines are obvious: The drawing up of the standards will produce a uniform terminology that will apply to the entire wind power industry.***

STANDARDS ARE USEFUL

The standardization system in Austria is an economic factor that cannot be ignored. The costs involved in this system amount to 58 million euros a year. However, the annual contribution to the gross national product is around 2.4 billion euros. In other words, every euro invested in standardization makes a profit of around 40 euros. Thanks to the ongoing work in standardization, companies are able to recognize early on the direction in which certain issues are developing. This knowledge leads to time savings, since adaption, renewal and innovation processes can be initiated in good time. Compliance with European and international standards also expands the sales market for Austrian companies. Furthermore, standards also increase the profitability of companies and promote the cooperation between them.

IEC 61400-26 – NEW GUIDELINES FOR THE WIND INDUSTRY

Bachmann electronic is the number 1 in the wind sector. The company therefore is heavily involved with the standards of the wind power sector. The relevant provisions have been set out under IEC 61400. The IEC 61400-26 standard thus defines, for example, the availability of wind turbines and wind farms. The project team responsible for this

regulatory framework was founded in 2007 with 35 members from eleven countries. This team is made up of wind turbine and controller manufacturers as well as energy suppliers and consulting firms.

IEC 61400-26 is divided into three parts. The first part regulates the time based availability of a single wind turbine. This part has been finalized and was published in November 2011. The second part specifies the production based availability of a single wind turbine. A draft is available for this, which is expected to be published early in 2013. The third and last part covers the time and production based availability of a wind power plant. Work on this was started in December 2011 and is expected to be completed in the summer of 2014. Only then will there be uniform and clearly defined guidelines for applications in the wind sector.

BETTER TO UNDERSTAND, EASIER TO COMPARE

The benefits of the IEC 61400-26 wind standard are obvious: The drawing up of the standards will produce a uniform terminology that will apply to the entire wind power industry. This will thus simplify communication between wind turbine manufacturers, wind farm operators, insurance companies and banks. The use of different terms, for example, meant that it was impossible to compare similar wind turbines. Simply by standardizing specialist terms, this will certainly be better.

ACTIVE PARTICIPATION

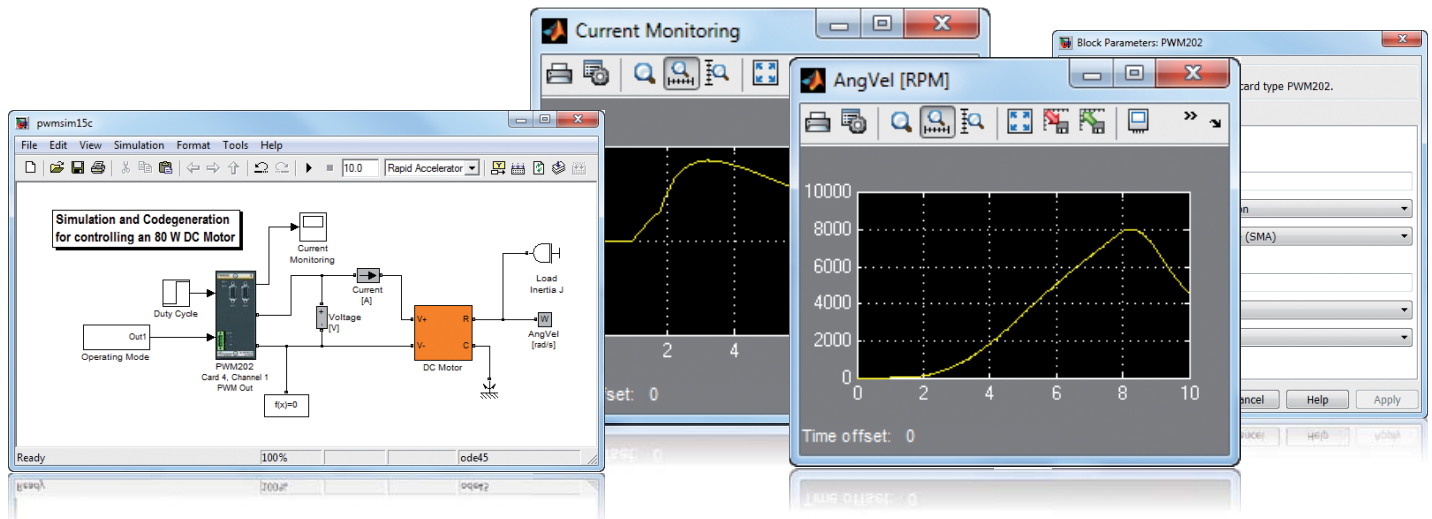
Bachmann electronic is participating in the working groups of the IEC 61400-26 standard. The company is thus actively engaged on the front line, shaping the future for the wind power plant and wind farm sector. Customers can thus benefit from first-hand know-how and from the forthcoming implementation of the requirements stipulated in the standards. ■

MODERN ENGINEERING – THE NEXT STEP

New version integrates Bachmann-specific interfaces

Model-driven design is one of the major buzzwords in modern engineering. The MATLAB/Simulink® simulation tool and M-Target for Simulink®, the associated code generation for the M1 controller system from Bachmann, provide this system with a powerful development environment. The new V1.50 R version of M-Target for Simulink® offers the user a wide range of helpful functions for easier and faster engineering.





SIMULATION IN PHYSICAL DOMAINS

In model-based development, both the process environment and the actual programs for the controller are first of all simulated on the computer. This process involves the mathematical modeling of open and closed-loop control algorithms. In the process simulation, domain-specific and physical modeling methods are used which considerably simplify the creation of simulations. Only at a later stage are real-time programs then transferred to the PLC.

SIMPLIFIED WORKFLOW

The company MathWorks offers a wide range of extensions for the MATLAB/Simulink® program package. The Simscape product group includes libraries for the simulation of physical domains from various areas, such as mechanical science, electrical engineering and hydraulics.

M-Target for Simulink® extends the functionality of Simulink® for the M1 controller, not only for code generation but also for simulation. Great importance is placed here on ensuring the simplest possible workflow for the user. This ensures that a functional simulation can be transferred simply to a real device and without any major effort.

BACHMANN PRODUCTS INCORPORATED IN THE LIBRARY

M-Target for Simulink® consists of a library that is specially designed for Bachmann. The new version integrates interfaces to the physical simulation for the first time. These are fully available for the user as well as the already existing mathematical simulation.

SIMULATION CODE AT THE PUSH OF A BUTTON

For example, the physical simulation mode can be activated for the PWM202, a module with a pulse width modulated H bridge and integrated current regulation. In the simulation program, the two terminals for connecting the load to the H bridge are thus provided directly at the output of the block corresponding to the PWM202. Elements from the Simscape library, such as resistors, coils or also motors, including the mechanical load, can

be connected to this block in the simulation program without any additional steps required. It is also possible to create a configuration with sensors for the electrical and mechanical values. The relevant code for the PLC section of the simulation can be generated virtually at the push of a button. Any optimizations necessary can be carried out at any time.

EFFICIENT WORKFLOW WITH THE MODEL BUILDER

In order to considerably simplify the programming of the M1 controller in Simulink®, the Model Builder was integrated in the new version 1.50. This enables simulation models to be categorized simply. The "only relevant for simulation" and "simulation and code relevant" categories ensure that only the necessary code-relevant sections are transferred to the controller. This therefore simplifies the structuring of the application into several software modules and even the distribution over several controllers. This function is supported by the integration of the SMI/SVI interfaces. The interfaces required for the 'bluecom' real-time protocol are naturally also provided. The new version of M-Target for Simulink® makes simulations even easier. They can be implemented faster, thus simplifying engineering and saving time and costs. ■

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The Future in View

Bachmann automation solutions stand out with a proven system availability of more than 99.96 percent. They are setting new directions for meeting the challenges of the future – round the world and round the clock.



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