SOLUTIONS 24

News: Phoenix Contact is SmartWire-DT cooperation partner | Winter-Proof: Drive monitoring with SmartWire-DT and PKE | Always Fresh Air: Innovative exhaust air system in the chemistry department | China Automobile: SmartWire-DT controls transport system in body shell production

P. 12
Tested Top Quality Eaton Automation
Content

- **News**... 4-11
- **Tested Top Quality**... 12-13  
  Toothbrush Production with Eaton Automation
- **Winter-Proof**... 14-15  
  Drive Monitoring with SmartWire-DT™ and PKE
- **Perfect Extrusion**... 16-17  
  Lean Connectivity with SmartWire-DT™ for Innovative Plastic Extruder
- **Always Fresh Air**... 18-19  
  Innovative Exhaust Air System in the Chemistry Department
- **Glued to Progress**... 20-21  
  First Cross Laminated Timber Press Ready to Start
- **China Automobile**... 22-23  
  SmartWire-DT™ Controls the Transport System in Body Shell Manufacturing
- **Cooling with Care**... 24-25  
  Cold Stores for the Long-Term Storage of Vegetables
- **Cereal Flakes & Pops Swiss-Made**... 26-27  
  Energy Distribution – Compact and Easy to Install
- **Intelligent Component Exchange During Renovation**... 28-29  
  Mobile Transformer Station with SVS Medium-Voltage Switchgear
- **Infoboard**... 30-31

Imprint
Solutions is the customer publication of Eaton’s Electrical Sectors EMEA

Published:
Eaton’s Electrical Sector EMEA
Eaton Industries GmbH
Hein-Moeller-Straße 7-11
53115 Bonn
Tel.: +49 228 602-0  
Fax: +49 228 602-62275  
E-Mail: info-bonn@eaton.com  
www.moeller.net/solutions

Editors:
Dirk Bolz (v.i.S.d.P)  
Christian Bücker  
Integral Dr. Schumacher®

Authors:
Christian Bücker,  
Jan Carls, Sven Cöster,  
Frank van der Laan,  
Andreas Miessen,  
Ernesto Mitruccio,  
William Oomen,  
Robert Perle,  
Integral Dr. Schumacher®

No. of copies: 17,000

This customer publication is protected by copyright, applicable to all articles, diagrams and photos. Eaton reserves all rights.

CS087030022-EN  
Article No. 166674  
Layout: buntebrause agentur  
Printed in Germany (11/11)

Translator: Terry Osborn  
TRANSTech Translations
Eaton set an important milestone with SmartWire-DT in 2009 when it was launched at the Hannover Fair. The SmartWire-DT System revolutionizes the installation of control wiring inside the control cabinet and is far superior to conventional control wiring in terms of the speed of mounting, use of materials and susceptibility to errors during installation. Solutions spoke to Christian Zingg, managing director of Eaton Automation, and Karl-Heinz Arndt, product manager for easy and SmartWire-DT at Eaton, about the latest innovations as well as other planned technological developments.

SmartWire-DT has been continuously developed in the past two years. What highlights will you be presenting at the SPS/IPC/Drives 2011 fair?

Ch. Zingg: We have progressively further expanded the SmartWire-DT range since its market launch. Two additional digital modules and three analog modules have thus been added to the SmartWire-DT I/O range. The analog modules cover analog inputs (current/voltage), analog temperature inputs (PT100, PT1000, Ni1000) and analog outputs (current/voltage).

The devices of the new XV102 touch display PLC series with an integrated SmartWire-DT master interface have been on the market since the beginning of the year. These high performance HMI/PLCs are available with 3.5 inch, 5.7 inch and 7 inch color displays. Together with the I/O modules they enable the implementation of highly attractive SmartWire-DT system solutions in terms of functionality and price.

K.H. Arndt: The development of a universal SmartWire-DT slave in the RMQ housing is another highlight. This meets the requirements expressed by the OEMs: They would like to have only one PLC program for the maximum configuration of a machine/system and all the variants derived from it. The universal modules enable users to design and program for the maximum expansion in the PLC configuration and in the PLC program. The hardware required for expansions does not yet have to be physically present. In this way, installation sections can be expanded at a later time by replacing the universal slave with the configured device, without having to change the program or hardware configuration, and only requiring a SmartWire-DT cable. SmartWire-DT can thus handle “gap programming”.

K.H. Arndt: That’s right. We have provided the PKE12 and PKE32 electronic motor-protective circuit-breaker series with a SmartWire-DT communication module. The solution is based on the Eaton motor starter combination consisting of the PKE12/32 motor-protective circuit-breaker, the electronic or electromechanical link, the PKE trip block and the Size 1 and 2 xStart contactors. The SmartWire-DT communication module also measures the actual current flow of the PKE as well as different signalling functions such as diagnostics, status or overload signals. In this way, all data
At the SPS/IPC/Drives 2011 fair we will also be presenting another SmartWire-DT communication module for the PKE65 electronic motor-protective circuit-breaker. We developed the mechanical design so that the SmartWire-DT communication module can be used with all PKE basic units – PKE12, PKE32 and PKE65 – irrespective of the contactor. This enables PKE motor-protective circuit-breakers to be networked as protective devices for soft starters, contactor applications with competitor switchgear, as an incoming circuit-breaker, as well as a networking solution for two-row motor starter assemblies (separately assembled motor-protective circuit-breaker and contactor).

Last year we introduced a SmartWire-DT communication module that communicates directly with the compact circuit-breakers. Control circuit devices with 1-bit data can be controlled in exactly the same way as circuit-breakers with 32-byte data. All NZM 2/3/4 circuit-breakers with an electronic release can be connected directly to SmartWire-DT. All currents up to 1600 A in the power distribution are thus within the access range of SmartWire-DT.

An Ethernet-based gateway (Ethernet IP / Modbus TCP) that offers connection to the SmartWire-DT system for the first time is another new development.

All the products mentioned are integrated in SmartWire-DT Assist – the powerful planning tool. The online function, for example, enables the first test of the switchboard installation to be carried without having to install a PLC.

What are your other development activities besides SmartWire-DT, and what are your objectives?

Ch. Zingg: We are naturally active in several areas. We have, for example, added a new and more powerful CPU (CP10) to the MFD-Titan series. The same goes for the XC series, where we have added another powerful CPU (XC202) to the range. Our broad objective can be described under the motto “From Lean Connectivity to Lean Automation”. We aim to reduce the number of components to a minimum, whilst maintaining or even increasing the quality of the control system.

Will the easy world be provided with integration in SmartWire-DT?

K.H. Arndt: For small applications that don’t require a fieldbus system, of which there are thousands, we have further optimized SmartWire-DT and integrated directly into Eaton controllers. We have already completed the first step with the touch display PLCs. We will be showing a direct integration in the world of the easy800 control relay at the SPS/IPC/Drives fair. Here we will be presenting two variants with which users can optimally implement small applications without having to install a gateway. We have also completed the integration in easySoft and fully embedded SmartWire-DT Assist in the software. Besides the planning functions, a configuration level was also implemented which allows the connection between the logic I/Os and the SmartWire-DT slaves. Particular importance was placed on simplicity, for which, of course, easySoft is renowned.

One of your first partners with SmartWire-DT is Phoenix Contact.

Ch. Zingg: That is correct. We are currently holding talks with some companies wishing to integrate their products into the SmartWire-DT system. Predevelopment activities are currently being carried at the same time. In the coming year, Phoenix Contact will launch the first product series with SmartWire-DT. Furthermore, in order to facilitate entry to the SmartWire-DT world for 3rd party customers, a development environment is also available that enables them to integrate their own switching devices into the SmartWire-DT system.
Phoenix Contact, global market leader in components, systems and solutions in electrotechnology, electronics and automation, and Eaton, one of the world’s leading manufacturers of energy distribution and UPS systems as well as components and systems for electrical automation technology, have concluded a cooperation agreement on the electronic Contactron motor starter with SmartWire-DT at the Hannover Messe 2011. On the first day of the trade fair, Roland Bent, managing director of Phoenix Contact, and Tom Gross, Vice Chairman and Chief Operating Officer of Eaton’s Electrical Sector, signed a contract which provides for the development and commercial exploitation of industrial, electronic switchgear and communications systems.

The objective of the collaboration is the development and implementation of a joint strategy on Contactron electronic motor starters and the establishment of SmartWire-DT as a new standard in the communications interface for intelligent switchgear. Both innovations, Phoenix Contact’s Contactron electronic starter motor and Eaton’s new communications and interconnection concept, SmartWire-DT, set new standards for size, interconnection technology, robustness and reliability. The advantages for mechanical and systems engineers are lower space requirements, reduced wiring and high levels of durability.

“In the smallest possible space, our Contactron electronic motor starters integrate motor switching and protective functions which were previously separately set up and wired with several traditional switchgear units. They thereby revolutionize the power wiring in the control cabinet. The combination with Eaton’s innovative SmartWire-DT technology now also replaces the complex parallel cabling of the control and signal functions of the switchgear units with a genuine lean connectivity system,” said Roland Bent, Managing Director of Phoenix Contact. “The combination of SmartWire-DT and Contactron technology will enable Eaton and Phoenix Contact in collaboration to considerably streamline control cabinet installation in industry,” he added.

Richard Boulter, Senior Vice President Industrial Control Division, Eaton Industries, commented on the joint project: “The addition to our product range of electronic Contactron motor starters with SmartWire-DT is a logical step for us in making our strategy ‘from lean connectivity to lean automation’ even more attractive to our customers. With it, we can offer both safe, efficient products and compelling end-to-end solutions around the world. Both companies are pooling their respective strengths in high-quality, new solutions in the installation and control of electronic motor starters, and the market will reward us for this.”

For over 80 years, reliability and safety in all aspects relating to motors have been part of Eaton’s core business. Whether it’s robust, reliable and field-proven interconnection technology, safe switching and protecting or energy efficiency, Eaton possesses extensive know-how in the field of motor protection and motor starters. Customers all over the world hold this competence in high regard and trust products from Eaton. The revolutionary SmartWire-DT technology was also developed by Eaton.

“The maxim ‘the easy way to connect’, the SmartWire-DT ASIC integrates the whole spectrum of requirements such as the transfer of small volumes of data in the price-sensitive sensor/actuator technology field. This also includes the transfer of higher volumes of data, such as are required for the integration of high-performance equipment – for example frequency inverters, electronic motor protection or circuit breakers”, said Dr. Martin U. Schefter, Business Unit Manager Industrial Automation and Managing Director of Eaton Industries Holding GmbH. “In addition, it integrates the power supply for SmartWire-DT units, particularly for the sensors and actuators.”

With Phoenix Contact, the specialist for interconnection and automation technology, and its Contactron technology, the stage is set for an optimum collaboration which in future will successfully bring new products in the field of electronic motor starters to the market.

Phoenix Contact’s hybrid motor starters combine the advantages of electromechanical and electronic switchgear in a single device, thereby providing a long service life and low dissipation. The low-wear motor starters feature four functions (clockwise / counterclockwise / motor protection / emergency stop) in a device only 22.5 mm wide. The integrated safety functions guarantee an emergency stop without additional elements.

Contactron motor starters save up to 75 percent in terms of space and wiring compared to conventional switchgear units.

With their global theme of “Smart Efficiency,” Eaton and Phoenix Contact see the Hannover Messe 2011 as the ideal platform to announce their strategic collaboration and present their solutions for cutting costs, optimizing processes and conserving resources. There are plans to enlarge the joint product range with further products featuring Contactron and SmartWire-DT technology.
The easy800 family is being extended with two new devices which offer the features of the easy800 control relay on the one hand and the connection to SmartWire-DT on the other. Instead of connecting the switching device inputs and outputs to the controller in the conventional manner, the new switching devices are connected to SmartWire-DT. Up to 99 SmartWire-DT slaves with over 160 inputs/outputs can be connected to the two new devices for the adequate control of small or medium-sized machines. A gateway for connecting to SmartWire-DT is unnecessary thanks to the SmartWire-DT master already integrated directly in the control relay device. This enables users to access the complete range of functions and connect all slaves in the SmartWire-DT line to a SmartWire-DT master.

Both devices (EASY80x-DC-SWD) come with a serial interface as standard for programming or connecting a remote display such as the Eaton MFD-Titan multi-function display (MFD-CP4 plus MFD-80-B). The first device, EASY802-DC-SWD, is provided with two power supply inputs: POW for supplying the device and the SmartWire-DT slaves, and AUX for the 24 V DC supply of connected contactors. The wide range of function blocks provided by easy800 are also available here, such as multi-function timing relays, counters, text outputs, value inputs, 7-day and year time switches, P-PI-PID controllers and maths function blocks, thus opening up a wide range of different applications.

EASY806-DC-SWD, the second device, is equipped with all the functions of the standard device. In addition to this other features are included, such as four digital inputs (24 V DC) used for high-speed counter functions. This device has a wide application range, regardless of whether it is used as a single-channel counter (up to 5 kHz), frequency counter (up to 5 kHz) or as a two-channel incremental counter (up to 3 kHz). Two of the four inputs can also be used as outputs (transistor 24 V DC, 0.1 A). These are used to support the pulse width modulation function blocks (up to 2 kHz) for temperature controls. The pulse output (up to 2 kHz) is provided for controlling stepper motor amplifiers. The function block can also be used for outputting a number of pulses at a freely selectable frequency. Like the easy800 devices, the EASY806-DC-SWD is also provided with the easyNet network, enabling up to eight devices – easy800, MFD-Titan, easySafety or also PLCs – to be networked simply.

During commissioning users can view online and fully test both the status of the SmartWire-DT communication system in its entirety and also of each individual slave, including all data, via a PC and the easySoft-Pro software. All the known functions and components of easySoft-Pro are provided, such as the complete simulation tool, the 16-channel oscilloscope or the documentation of the circuit diagram with a cross reference list. For SmartWire-DT, the easySoft-Pro was provided with the SmartWire-DT configurator which creates the SmartWire-DT line with all slaves. The Automatic operand assignment function offers a considerable time saving: easySoft-Pro creates a standard assignment for all slaves. The operand assignment can naturally be changed or can be completed manually as required. easySoft-Pro therefore supports the user in all programming and commissioning steps as well as with later maintenance activities.

Quicklink ID: ES2401
SmartWire-DT™ Now Also for Ethernet/IP and Modbus-TCP

The innovative SmartWire-DT communication system for networking control circuit and switching devices can now also be connected to controllers via an Ethernet/IP or Modbus-TCP network. This is made possible thanks to the new EU5C-SWD-EIP-MODTCP SmartWire-DT gateway which comes with a 10/100MBit switch and simplifies the configuration of linear structures. The additional diagnostics interface simplifies commissioning and helps users with any troubleshooting. The powerful SmartWire-DT Assist planning and commissioning software enables users to configure the SmartWire-DT network easily. The online function of the SmartWire-DT Assist in particular enables the first test of the switchboard installation to be carried without having to install a PLC. All inputs and outputs of the SmartWire-DT slaves can be exported simply and used in the PLC configurator of the controller manufacturer used (e.g. RSLogix 5000).

The software developed by Eaton for SmartWire-DT simplifies planning and enables the user-friendly testing and commissioning of all switching and control circuit devices. The latest version 1.40 of SmartWire-DT Assist now also allows the configuration of the new EU5C-SWD-EIP-MODTCP gateway. The Ethernet IP/Modbus-TCP gateway enables an Ethernet-based connection to the SmartWire-DT system for the first time, so that Eaton is now covering important fieldbus systems for commonly used controllers.

The software is available free of charge for downloading.

New SmartWire-DT™ Modules for PKE

Extended drive monitoring from 0.3 A to 65 A with PKE12/32/65 motor-protective circuit-breakers and SmartWire-DT™

The special features of the Eaton PKE motor-protective circuit-breaker with electronic release can be optimally exploited with the connection to SmartWire-DT. The combination of SmartWire-DT and PKE enables remote motor data to be monitored continuously and transferred to a higher-level controller or process control system without the need for expensive analog IO technology. In this way, operating data such as the motor current of the highest phase and the thermal load of the motor can be read out and visualized. The causes of tripping, the set value of the overload release/time lag (Class) and the type of trip block are also transferred.

Depending on the application, the following function modules are available for connecting motor starters with PKE electronic wide-range overload protection to SmartWire-DT:

1. PKE-SWD-32 SmartWire-DT module

The PKE-SWD-32 function element is used for compact MSC-DEA-... motor starter combinations consisting of PKE12/32 and DILM7–DILM32 (0.09 kW - 15 kW) contactors. The function module is snap fitted onto the contactor and connected to the PKE-XTUA electronic trip block. As well as transferring the operating data from the motor-protective circuit-breaker, the contactor actuation and the feedback signalling are also implemented via SmartWire-DT. The selectable ZMR overload relay function isolates the main contacts through the contactor in the event of an overload.

2. PKE-SWD SmartWire-DT module

The PKE-SWD function element is used for PKE12/32/65 motor-protective circuit-breakers and/or for motor starter combinations consisting of the PKE65 motor-protective circuit-breaker and DILM 40 - DILM 65 (18.5 kW - 30 kW) contactors, and is fitted directly onto the PKE motor-protective circuit-breaker and connected to the PKE-XTUA trip block. This enables the PKE motor-protective circuit-breaker to be connected to SmartWire-DT without a contactor, such as when using PKE for the group protection of several drives or with a separate motor-protective circuit-breaker and contactor arrangement.
Electrical motors currently in operation come in a wide range of different variants. In the majority of processes their particular features enable them to determine production efficiency. A motor fault often not only jeopardizes the device, but also prevents a smooth production process and causes costly downtimes. Motor protection is therefore not only essential from a technical point of view but also from a financial perspective.

The selection of suitable motor protection is therefore of central importance and determines the functional safety and lifespan of a motor. Thanks to their special features, the PKE motor-protective circuit-breakers offer an interesting alternative to the bimetal solution and an addition to the Eaton PKZ device line. Compared to devices with a thermal release, motor-protective circuit-breakers with electronic wide-range overload protection feature several key benefits. These include large setting ranges, a low heat dissipation, tripping classes also higher than Class 10, as well as precise and extremely long-time stable tripping characteristics. The large current setting ranges reduce the number of variants by up to 80 percent compared to those with bimetal trips. This minimizes engineering requirements as well as costs, whilst reducing stock-keeping and tying up less capital.

As well as the existing PKE motor-protective circuit-breakers in the current range up to 32 A, Eaton will be launching the PKE 65 from Q4/2011, and thus providing another motor-protective circuit-breaker with electronic wide-range overload protection. The compactly designed modular PKE for motor currents up to 65A offers optimum flexibility. Modular standard components for creating motor starters are perfectly matched and easy to combine. Users can make use of accessories from the Eaton PKZ system, thus meeting the customer requirement for devices that are exactly tailored and easy to exchange.

When used in conjunction with SmartWire-DT, motor-protective circuit-breakers and motor starter combinations with PKE open up the possibility of integrating in the automation world. The PKE-SWD modular COM interfaces for PKE12, PKE32 and PKE65 motor-protective circuit-breakers, and the PKE-SWD-32 interface for MSC-DEA motor starter combinations with PKE12 and PKE32 motor-protective circuit-breakers, enable the actual current of the drive and the thermal motor load to be measured as well as various indication functions, such as diagnostics, status or overload. The data is transferred via SmartWire-DT directly to the controller and is made available throughout the entire plant for condition monitoring or for remote maintenance tasks. The motor-protective circuit-breaker is integrated in SmartWire-DT, and adds additional availability, efficiency and cost effectiveness to its basic on/off switching for normal operation and protective functions. This allows predictive maintenance and repair, thus increasing reliability and system availability, as well as proactive access to process data in the operating sphere of the motor-protective circuit-breaker.

Quicklink ID: ES2404

PKE 65 Motor-Protective Circuit-Breaker

PKE 65 motor-protective circuit-breaker with electronic wide-range overload protection extends the PKE range
TÜV Certificate
Safe monitoring of furnaces with easySafety

Machines and plants give rise to potentially dangerous motion sequences that require a technical solution to make them safe. Safety devices such as emergency-stop pushbuttons, guard doors, light curtains and operating elements for safe setting must be controlled and monitored, and the installation may have to be switched to a safe state. Safety-related monitoring is also required in furnaces. Eaton’s easySafety control relay for safety applications has now also been tested and approved by TÜV Rheinland for use in the safe monitoring of furnaces in accordance with EN 50156: easySafety thus enables users to implement a safety disconnection in the fuel supply to furnaces up to safety level SIL 3.

However, easySafety not only monitors all typical safety equipment, but also takes on the control tasks for machines and plants, whilst keeping the safety and standard circuit diagram strictly separate. The safety-related control relay meets the highest requirements: It complies with category 4 in accordance with EN 984-1, Performance Level PLe in accordance with EN ISO 13849-1, Safety Integrity Level SIL CL 3 in accordance with EN IEC 62061, as well as SIL 3 in accordance with EN IEC 61508.

Each device of the easySafety series comes with 14 safety inputs and up to five safety outputs that can be used for safety monitoring and control tasks. easySafety devices come as standard with a host of conventional safety relays in the form of safety function blocks such as emergency-stop, guard door monitoring, optionally with the monitoring of guard locking, light curtain with and without muting, two-hand control button, safety switch mat, enable switch, safety foot switch, operating mode selector switch, zero speed and overspeed monitoring, external device monitoring, safety timing relays and safety markers.

“Eaton Catalogs” in the App Store
Always up-to-date: catalogs, brochures, customer magazines

The new Eaton Catalogs App for smartphones and tablets includes the current Eaton Main Catalog, the brochure “From Lean Connectivity to Lean Automation” and the latest issues of the Eaton SOLUTIONS customer magazine.

Eaton Catalogs provides customers with a further communication alternative. The Eaton Catalogs App meets the requirements for fast, mobile communication of production information. It provides a highly attractive and clearly designed user interface with fully developed functions. In the form of a shelf view, the user is provided with a clear overview of Eaton's latest product catalogs. These can be browsed on the fly or downloaded to the device. The Update function ensures that customers are always kept up-to-date.

Users can operate the catalog intuitively and can navigate by simply browsing through the catalogs – almost like when browsing the printed version. A linked table of contents, thumbnail views and a rapid search function simplify searches for the required information. As product information is often required which is not available in the product catalog, Eaton Catalogs contain article numbers and type designations that are linked systematically to the data sheets to the Online Catalog. From this detailed product information, other documents such as instructional leaflets and technical publications can be called up.

The Eaton Catalogs app is now available from the App Store for iPhone and iPad. Users can simply search there for Eaton or scan the QR code with their iPhone or iPad camera to access the Download area directly.

The catalog portal is the entry page to the Online Catalog. Key elements include the powerful search function and the graphical navigation. The clearly designed user interface makes every application particularly easy to use. Always up-to-date, with the latest product data and product innovations.
xEnergy is a freely combinable power distribution system, specially designed for the infrastructure sector in buildings and industry up to 5000 A. The system consists of switchboard and protection equipment, built-in system technology and the switch cabinet itself, including planning and calculation tools. It enables users to implement power distribution systems that are both safe and reliable. Optimum mechanical adaptation of the switch cabinet components to the Eaton switchboards means reduced assembly times and increased flexibility. The complete units comprising switchboards, built-in system technology and switch cabinet are type-tested to comply with IEC/EN 61439 and thus offer a high combined safety standard.

There are five basic types within the xEnergy switchboard system: XP (power compartments), XF (fixed compartments), XR (removable compartments), XG (general compartments for universal use) and the latest development – xEnergy XW (withdrawable compartments).

xEnergy XW completes the xEnergy switchboard system product portfolio with the addition of withdrawable technology and allows it to be used as an MCC (Motor Control Center) and PCC (Power Control Center).

xEnergy XW allows withdrawable units to be implemented as power outgoers with PKZ and NZM circuit breakers up to 630 A and motor controllers with motor starters up to 250 kW. Empty withdrawable units are also available for individual applications. All unit sizes are cleverly designed in the same way and easy to operate; no special tools are required. Users can replace xEnergy XW units quickly and safely – even when voltage is applied – thus minimizing downtime and increasing system availability.

There are also three clear status displays for “Operating”, “Test” and “No-voltage”, ensuring increased safety during maintenance work.

Eaton xEnergy switchboard systems allow safe and efficient power distribution up to 5000 A. They can be used in fields ranging from commercial construction, through power distribution systems for hotels and shopping centers, right up to industrial applications such as sewage treatment, the food and drink industry and logistics.

(1) = panel builder assembly
The system provides reliable motor control and power distribution functionality for all industrial and commercial installations. The innovative design combined with Eaton’s expertise in the area of low voltage applications brings a new platform that is the reliable heart of any motor control or power distribution system.

CX is a compact, ergonomic and flexible system. The new system incorporates features like a mechanical test position for secondary circuit testing of the withdrawable unit. This unique, innovative and patented mechanical test position mechanism allows for the control circuits to be tested with both incoming and outgoing power terminals disconnected.

A coloured indicator shows from a distance the position of the withdrawable unit and the IP-integrity IP3X is not compromised when the unit is in the test position. More than a century of designing and manufacturing low voltage systems comes together in the CX. Power Xpert CX is a reliable solution for applications where the supply of energy is vital for your business process. Providing internal separation to form 3b and 4b, the withdrawable units can be exchanged without having to disconnect power and/or control cabling. CX is verified by testing according to IEC EN 61439-2, guaranteeing maximum operational and personal safety.

Moreover, the system also complies with the IEC/TR 61641: the guide for testing under conditions of arcing due to internal fault.

Application areas

The innovative design makes the CX system especially suitable for applications where the delivery of electrical energy is business critical: such as in water industries, pharmaceutical industries, industrial facilities, food & beverage, infrastructure, pulp & paper, mining industries, steel industries.

By adapting the SASensor products from Locamation, the FMX is easy to protect and control. In this way, it is easy to measure the power, to monitor the voltage quality, to localize faults, and to obtain more accurate data. The system is therefore ideally suited for use in current energy networks as well as electricity grids (smart grids) in the future. Due to the simple architecture of the SASensor system, future upgrades or replacements of a CCU can be carried out easily without a major modification of the base.
Every day we make use of some objects without giving them much thought, and the same goes for how they are manufactured. The production of toothbrushes, for example, requires the use of a very mature technology and a great deal of know-how. M+C Schiffer, based in Neustadt near Cologne, is an internationally recognized innovator in toothbrush production, and produces over one million toothbrushes a day in three shifts, seven days a week, on fully automated manufacturing lines.

The production of toothbrushes involves a precisely coordinated chain of different processing stations: M+C Schiffer developed the complete production process themselves and integrates injection molding machines, handling systems as well as processing and packaging machines in the production chain. M+C Schiffer also develops new toothbrush models together with customers, and these include well-known companies and their brand products, such as GlaxoSmithKline with Dr. Best Aquafresh and Sensodyne, Johnson&Johnson with Reach, P&G with OralB and Blend-a-mend, as well as discount stores and drugstores such as Aldi, Rewe, dm, Rossmann and Schlecker.

The time synchronization of the process steps on the one hand, and the speed of individual processes on the other, present a particular challenge in the manufacturing process. Production at M+C Schiffer is fully automated in line, right through to packaging, as only a “no human touch” production meets the hygiene requirements specified.

Multi-component injection molding machines are used in the first production step to produce up to 32 toothbrush base bodies made from polypropylene (PP). The second component made from soft TPE is injected in the second operating cycle. This produces up to 80 toothbrush handles a minute. A handling system then transports the toothbrush base bodies to the bristle embedding plant. The specialist for this segment is Zahoransky, a group of companies based in Todtnau-Geschwend. The bristles, which are also called filaments, are embedded in every individual hole of the toothbrush bodies at a frequency of 1000 cycles a minute. The filament bundles are embedded using an anchor wire (flat type of special wire) which is punched into the recesses of the bristle carrier at high precision with the centrally folded filaments. Depending on the type of toothbrush, up to 50 filament bundles in different lengths, colors and
bundle positions are thus embedded in succession. In further production steps, the filaments are cut to defined lengths and rounded in multi-stage grinding processes.

The quality assurance is provided by a fully automated camera-supported control process, which ensures that only fault-free toothbrushes reach the packaging station. Transparent packaging film is given its final shape in the plastic thermoforming process. M+C Schiffer packs products in a range of different package variants in order to meet the relevant customer requirements. To achieve a daily production of over one million toothbrushes, a highly reliable technology is absolutely vital.

Highly reliable control technology

The control of the entire bristle embedding system is handled by an Eaton compact PLC. The data exchange to the servo controllers, remote I/Os and operator display is implemented via CAN bus. An Eaton XP700 industrial PC with a 15 inch touch display is used for operation and assigning plant parameters. The ruggedly designed infra-red touch display with safety glass ensures a high degree of reliability and meets specified hygiene requirements in accordance with the applicable food regulations. Thanks to its compact housing design and small mounting depth, the touch display can be integrated ergonomically in machines and plants. Local programming access in the field is provided via Eaton RMQ-USB and RJ45 terminals (IP65). The integrated web server enables the controller to be accessed remotely.

Eaton’s Galileo software is used for visualization, and is an easy to learn and yet powerful project design environment. With its non-sector specific concept, Galileo offers seamless project designing for all XP/XV operator units from the Eaton HMI product range as well as for PC runtime solutions. Galileo always provides the project designer with the full functionality without any graduated restrictions on tags (variables) or screens, according to the performance specifications of the panel used.

Users program the Eaton controller with XSoft-CoDeSys-2: This technically mature software based on the CoDeSys standard of 3S is impressive, thanks to its simple handling, and is well established in the automation world.

CONCLUSION

Dipl.-Ing. Andreas Walgenbach, project manager at M+C Schiffer, sums up as follows: “Our customers require just-in-time production for particular product launches or for special marketing campaigns. We then have to produce a specific number of products, often in the millions and deliver exactly on time. We can only keep to these delivery times if we can count on absolutely reliable production technology, components and suppliers. We are regarded as highly reliable partners by our customers, and for this our thanks must also go to Zahoransky toothbrush machines and Eaton automation technology.”

Dipl.-Ing. Robert Dous, Director Sales & Marketing at Zahoransky: “Eaton’s control and automation technology is an essential component in meeting the demanding requirements of toothbrush production at M+C Schiffer and ensuring highly reliable systems. Only in this way, can we meet our extremely high standard.”
Winter-Proof

Drive Monitoring with SmartWire-DT™ and PKE

The Lorüns crusher and screening plant (BSL) used the winter break over 2010/11 to upgrade the existing sand and gravel plant with state-of-the-art technology. In addition to changing over to a state-of-the-art process control system and replacing the entire power section, Eaton’s new SmartWire-DT communication and connection technology was also implemented in combination with the PKE electronic motor-protective circuit-breaker. The sector professionals at Keckeis, an Austrian company based in Rankweil, who were the contractors for the project, had quickly recognized the benefits of SmartWire-DT with operating current measuring, and the clients at BSL also gave their unreserved consent to the new solution.

Experts in the field know the problem of starting iced up elevating conveyors in the morning in freezing temperatures all too well: The stiffness of the empty conveyor belts due to frozen water in the belt pockets causes the motor currents to increase right up to the operating limits. When material is then added, the drive enters the overload range and the motor protection shuts down the conveyor. A restart is then mostly only possible after the conveyor line has been emptied by tediously shovelling off the conveyed material by hand.

After upgrading the sand and gravel plant with SmartWire-DT, the iced up belt can be automated to “run warm” until the operating current has dropped to “idle running”, and only then is material conveying enabled. Any accidental material conveying and likewise any excessive warm running are prevented. A far greater benefit for BSL is the controlled operation of the plant close to its maximum output limit, i.e. optimized and safe plant operation.
This is because varying total weights are transported at the Lorüns crusher and screening plant, due to the humidity and grain size of the transported material. The outstanding benefit is the enhanced drive monitoring functions: The actual motor current can be displayed and evaluated continuously without the need for any expensive analog I/O technology.

With conventional motor control using motor-protective circuit-breakers and contactors, the switching states of both components (ON) are interrogated to make an indirect evaluation of the operating state and the detection of a standstill. A hardware solution such as a speed sensor, load shedding relay etc. is required for a real and reliable feedback signal. When the set current value of the drive is exceeded in the event of an overload, the drive is shut down immediately in order to protect the motor from being destroyed and a fault is indicated. This results in several unplanned breaks in operation that can take a lot of time to rectify and often involve high downtime costs.

It is in this particular aspect that SmartWire-DT shows its tremendous benefits: The evaluation of the actual operating current makes it possible to distinguish between the following six operating states at BSL (according to the drive task):

- Motor switched off
- Motor underload
- Motor idling
- Motor operation
- Motor overload
- Motor fault

The individual load limits as well as the time characteristics can be programmed as required for the particular drive application at hand. This enables the plant operator to detect imminent faults early on and enables interventions in the production process before an unscheduled interruption occurs.

The use of the PKE motor-protective circuit-breakers in connection with SmartWire DT enables the central monitoring of all the drive motors of the conveyor belts and considerably increases the system’s availability.

Under the management of Manfred Keckeis, founder of Keckeis Elektrotechnik GesmbH & Co KG, Rankweil/Austria, the former installation company has specialized in the last 20 years in two areas – ski storage systems and control tasks in the building materials industry. Keckeis can add several reputable tunnel projects as well as major building projects in Europe and in the Arab Emirates to its list of references.

Manfred Keckeis, general manager at Keckeis Elektrotechnik, Rankweil/ Austria, made this assessment: “The decision made jointly with BSL to not only upgrade the power section but also to replace it with SmartWire-DT in combination with Eaton’s PKE electronic motor protection has not only paid for itself very quickly in terms of investment but also in terms of system availability. As well as the neat and extremely fast “wiring” of SmartWire-DT, its space saving design was particularly ideal for the limited space available in the control room. The aim is also to give our customer a convenient solution that is easy to operate. SmartWire-DT’s status messages and self-diagnostics options are therefore a tremendous help.”

Junior boss Michael Keckeis also had this to say: “SmartWire-DT with PKE offers a host of benefits when reliable feedback signalling and a high level of system availability are required. SmartWire-DT is Eaton’s logical further development in response to the market demand for intelligent switchgear – an attractively priced combination of proven switchgear and upgraded with the SmartWire-DT communication and connection system.”

Continuous drive monitoring: SmartWire-DT together with PKE motor starter combinations. In addition to being an extremely powerful communications and wiring system, SmartWire-DT reduces the time-consuming wiring and installation work required on many switchgear systems by over 60 percent.
Perfect Extrusion

Lean Connectivity with SmartWire-DT™ for Innovative Plastic Extruder

Plastic extrusion normally involves a continuous process over multiple stages. The basic raw materials are metered into a heated screw. One or two counter rotating or corotating screw shafts mix and melt the basic material and the additive homogeneously. The melt is finally fed out via a nozzle. Polymers and compounds are normally used, together with the additional ground material and additive. This results in continuous lengths of material with the cross section of the nozzle. Walter Pirrung, a company based in Großostheim near Aschaffenburg, supplies innovative extruders for plastics, and the company is well-known throughout Germany for its customer-driven new developments in extrusions materials. The Forchheim-based company IVK Schaltanlagen und Systemtechnik GmbH & Co. KG plans, designs and installs the switchboards required for this. For the technically challenging Pirrung extruders this is no trivial task. Thanks to SmartWire-DT from Eaton, the previously huge wiring effort could be significantly reduced. The I/O interface is now also considerably less time consuming.
Depending on two process principles, extruders are either processing or compounding extruders. The first type shapes chemical and/or physical material whilst the second type modifies it. In Germany, the Großostheim-based Walter Pirrung company is no longer an insider tip when it comes to customer-driven plastics extrusion. Whether for metering, supplying the quantity, mixing, discharging, cooling and cutting, or exhaust air extraction and energy recycling, and also for cleaning, maintenance or repair — all these steps require a high level of technical know-how.

However, every Pirrung extruder, in fact the entire Pirrung Compounding line, is not only a masterpiece in itself but also only provides reliable and safe operation in conjunction with mechanical and electronic components. For this Walter Pirrung relies on the expertise of IVK Schaltanlagen und Systemtechnik GmbH & Co. KG, Forchheim. This company has been active in the market for 17 years and stands out from its competitors with its design and development skills. IVK uses Eaton’s SmartWire-DT connection and communication technology for building the panels for Walter Pirrung. Harald Schick, technical manager at IVK, explained the reason: “The cabling effort on similar projects proved to be extremely time consuming. On the current project, the extruder, we use SmartWire-DT to connect the PLC, an HMI-PLC XV152 from Eaton. The XV152 touch panel is used to provide the visualization and operation, whilst the PLC integrated in the device also acts as the CANopen master. We use five CANopen gateways, and all contactors and motor-protective circuit-breakers are connected to SmartWire-DT – and that is basically all that is required.” Harald Schick adds: “Around 60 PKZM motor-protective circuit-breakers were used with a plug connection to 3 kW DILM contactors. The auxiliary contacts are connected to the SmartWire-DT. All interface nodes receive their signals in real-time. This also applies to the metering drives which are controlled by frequency inverters and are networked via CANopen. The core of the extruder is a 200 kW water-cooled three-phase asynchronous motor which is also controlled by a frequency inverter likewise via CANopen.”

The compounding system is part assembled and supplied to customers. The system is commissioned on site by IVK. Harald Schick highlights a special feature: “This extruder can be operated without any problem, and all individual components of the system are perfectly matched up and controlled by a central PLC. Whilst all the processes are running in Automatic mode, all SmartWire-DT slaves can be switched on and off manually in Manual mode.” The extruder and its heating zones are first heated in the production line for about 30 minutes (variable between 250° to 400° at an accuracy of up to +/-1°). The metering system is then engaged and the discharged continuous length is fed to the cooling bath and finally to the granulator.

PKE motor-protective circuit-breaker with SmartWire-DT

PKE motor starter combinations with SmartWire-DT enable users to ensure integration in the automation world: The PKE-SWD-32 modular COM interface also provides the actual current flow of the PKE as well as different signalling functions such as diagnostics, status and overload signals. All process-relevant data is transferred directly to the controller and save time-consuming troubleshooting during commissioning and maintenance. The central PLC or a control system are always provided with up-to-date and precise diagnostics data, and tripping and overload values can also be set for motor protection. A virtually system-immanent manipulation with SmartWire-DT ensures a high level of safety.

INFO

The company: www.ivk-forchheim.de

Products: SmartWire-DT with CANopen gateways
HMI-PLC XV152
Miniature circuit-breakers
PKZ M motor-protective circuit-breakers and
DIL M contactors with tool-less plug connectors
XIVON

Quicklink ID: ES2412 [www.eaton.com/moellerproducts]

The company IVK Schaltanlagen und Systemtechnik GmbH & Co. KG in Forchheim has around 40 employees and operates in the following fields: Software and hardware engineering, mechanics, panel building, installation, commissioning, service, electrical and mechanical drives, powertrains. It has a solid experience base in the paper industry, the retrofitting of production plants, regenerative energy (solar), environmental and hydro applications, and also in the building of special machines and plants.

CONCLUSION

Harald Schick, technical manager at IVK, summarizes: “Several demanding functions on the extruder production line can be connected via SmartWire-DT. Thanks to SmartWire-DT and the CANopen gateway we have considerably reduced wiring effort and were also able to significantly reduce the number of I/Os. The switchboard now has a really slim, spacious and clear layout. We are known by our customers for fast response times – and we are no longer slowed down by the cabling of the switchboard. For us SmartWire-DT is a connection and communication technology with a real value addition.”
Always Fresh Air

Innovative Exhaust Air System in the Chemistry Department

The exhaust air system in the buildings of the chemistry department of a major German university urgently required a new concept. Thanks to the extensive expertise of the Aachen-based company, Wagner & Müller, it was awarded the contract for its impressive solution concept which included Eaton’s SmartWire DT communication and connection system and PKE motor starter combinations. Compared to conventional HVAC building solutions, the new solution is based on high-performance standard components and offers verifiable cost savings.

The exhaust air systems of three buildings belonging to the chemistry department of a German university were due for an upgrade. There were several individual problems in opening doors as the supply air system had failed. In all, five systems were designed that had to be commissioned in succession.

The solution for the exhaust air system includes the use of SmartWire-DT. SmartWire-DT is the seamless connection and communication technology from Eaton. The uniformly designed and open system replaces the control wiring in all components from the circuit-breaker to motor starters and frequency inverters right through to pilot devices. In all, around 500 Eaton PKE motor starters were used in the chemistry faculty, with each one being used in combinations of two starters for small and high exhaust air fan speeds. The two speeds are interlocked by means of both the hardware and the software. Several small rooms or one large one are assigned to a fan, with each fan being installed on the roof of the building.

Each of the five systems of the chemistry department consists of a switchboard (2.60 m wide, 2 m high), each containing an Eaton HMI/PLC – a 7.4 inch touch panel of the XV series with a Profibus DP fieldbus interface – as well as the DOL starters mounted on the SASY 60i busbar system from Eaton. In combination with the Eaton motor-protective circuit-breakers and circuit-breakers, SASY 60i forms a cohesive, UL certified solution for switching, controlling, protecting and distributing power.

PKE motor starter combinations with PKE connected to SmartWire-DT enable the university to ensure integration in the automation world: The PKE-SWD-32 modular COM interface also provides the actual current flow value of the PKE as well as different signalling functions such as diagnostics, status or overload signals. All process-relevant data is transferred directly to the controller and is made available over the entire system. The data transparency thus created increases the efficiency and operational reliability of the drives in the area of the motor-
The company: www.wagner-mueller.de

Products: PKE motor starter with SmartWire-DT, XV100 touch display PLCs, SASY 60i busbar trunking system

Quicklink ID: ES2422 [www.eaton.com/moellerproducts]

Wagner & Müller GmbH & Co. KG is a company based in Aachen that can look back on over 60 years of corporate history. The family-owned business with more than 50 employees has global operations, and is a competent and reliable partner for application solutions for power distribution, automation, control and drive engineering as well as software development for industry and trade.

INFO

The company: www.wagner-mueller.de

Products: PKE motor starter with SmartWire-DT, XV100 touch display PLCs, SASY 60i busbar trunking system

Quicklink ID: ES2422 [www.eaton.com/moellerproducts]

INFO

The company: www.wagner-mueller.de

Products: PKE motor starter with SmartWire-DT, XV100 touch display PLCs, SASY 60i busbar trunking system

Quicklink ID: ES2422 [www.eaton.com/moellerproducts]

The proposed solution for the chemistry department of the university offers several benefits. The building automation concept is not based on a proprietary island solution but solely on standard components. Any qualified technician can carry out maintenance work on hardware and software, as well as expand the system as required in accordance with the standards. This also applies to the HMI/PLC, since like all of the xSystem product groups, the XV100 series is programmed as a PLC with the CoDeSys-based xSoft-Codesys-2 programming system in accordance with IEC61131-3. Either Galileo or the CoDeSys Target visualization implemented here can be used as the visualization software. Each HMI/PLC of the five systems is backed up by an Eaton 5125 UPS.

The installed solution also allows the university to implement an efficient energy management system. The energy consumption of all motors can be evaluated and all values passed to a monitoring system for analysis.

The exhaust air system is also designed so that if level 2 (high speed) fails, the exhaust air system can continue to operate via the activated level 1 (low speed).

Autonomous exhaust air system with central control system option

The five exhaust air systems operate independently. They therefore do not require a connection to the central control system in order to operate fully. The control level currently uses Modbus which is connected via a gateway to BACnet. A connection of the SmartWire-DT system via Profibus DP to the central control system is being discussed. This allows the implementation of a central monitoring system, and the SmartWire-DT already provides this option to thus ensure future-proof design. Motor currents of the 250 double drives could not only be monitored in parallel via the SmartWire-DT cable, but the touch panel could also transfer this information to the building control center via OPC.

PKE with pluggable ZMR trip block

Another function offered by the PKZ motor-protective circuit-breaker is the use of pluggable trip blocks – in this case the ZMR: Combined with the PKZ basic unit, the pluggable ZMR-PKZ trip block with an overload relay function does not initiate the disconnection of the protective circuit-breaker in the event of a motor overload, but switches off the downstream contactors. In this way, the PKZ stays closed and does not have to be manually reset.

Clarity and convenience: both the operation and the control of the five systems are implemented with a 7.4 inch touch display PLC.

Dipl. Ing. Robert Wagner, CEO of Wagner & Müller, sums up as follows: “We presented our proposed concept to the planners at the university, who, even with their extensive technical knowledge, were impressed by our solution. With SmartWire-DT and the PKE motor starter combinations we are taking the ideal approach since our panel not only saves money. SmartWire-DT increases system availability, reduces wiring in the control circuit and saves time consuming troubleshooting during commissioning and maintenance.”

CONCLUSION

Dipl. Ing. Robert Wagner, CEO of Wagner & Müller, sums up as follows: “We presented our proposed concept to the planners at the university, who, even with their extensive technical knowledge, were impressed by our solution. With SmartWire-DT and the PKE motor starter combinations we are taking the ideal approach since our panel not only saves money. SmartWire-DT increases system availability, reduces wiring in the control circuit and saves time consuming troubleshooting during commissioning and maintenance.”
For decades, Minda Industrieanlagen GmbH, based in Minden, has been a leader in the development of press systems for the production of glulam timber. One new product is a hydraulic press system for the production of cross laminated timber. The first complete system was installed in April 2011 at the plant of Eugen Decker Holzindustrie KG in Morbach. It meets the special requirements defined by Eugen Decker, placing importance on flexible and order-related production.

In the Eugen Decker project, user-friendliness is implemented with RMQ-Titan pilot devices which are connected in decentralized control consoles via SmartWire-DT and Profibus-DP to a Simatic S7. The entire process from laying the longitudinal and cross layers to pressing multi-layered elements is fully automatic. The lamellas of the cross and longitudinal layers are placed directly on the laying table and glued. Special side adjusters press the longitudinal layers together from the side beforehand; the compacted cross layers are also placed on the laying table with as few gaps and joins as possible. This pre-pressed layer cake is then moved into the press. Before applying the main pressure, the external longitudinal or cross layers are hydraulically pressed together at high pressure with absolute precision.

Minda developed a hydraulic CLT press especially for this purpose. With precise regulation and control it provides high pressure forces with a minimum use of energy. The press is designed for a pressure of 0.8 N/mm² at maximum formats. This pressure, which corresponds to a load of 272 t/m at a press width of up to 3.40 m, is absorbed by an extremely stable steel gantry. Large area press plates apply the force to the wood stack which is positioned on a level press table.

All the setting data specified beforehand by the work scheduling is provided via a network from a Minda server. All the required quality parameters are likewise determined via the server and
The press conveying system is implemented with a heavy module belt which is passed lengthwise through the press and ensures fast loading: A new element is fed into the press at the same time as a pressed element is passed out. A fast and seamless transportation of the glued board stacks is ensured thanks to the smooth surface of the module belt.

Control technology with RMQ-Titan and SmartWire-DT

The massive distribution panel with five control cabinet sections is connected to the periphery via Profibus DP. Each actuator (electromechanical, pneumatic and hydraulic) must be controllable for maintenance or for retrieving damaged parts. Due to the complexity of the system, each individual station contains a large number of integrated operating elements, which, if wired in the conventional way, would involve extensive wiring and the associated high susceptibility to faults. Each contact or indicator light would thus be wired individually and run separately to the input/output modules of the controller. With SmartWire-DT this is different. Each of Eaton’s RMQ-Titan pilot devices is connected to the green ribbon cable with a single click. RMQ-Titan devices are fitted together with SmartWire-DT function elements quickly and error-free: Simply fit the device plug, and that’s it. In the SmartWire-DT system, each SmartWire-DT function element has its own address as well as separate diagnostics, thus offering fast and efficient diagnostics in the system.

A green SmartWire-DT round cable connects the control panel with the periphery. The M22-.. surface mounting enclosures are connected with cable glands or plug connectors (optional accessory). The boards are connected simply via color-coded push-in terminals. The required function elements then just have to be snap fitted onto the base fixing. Depending on the actuation device used, the function elements can also be front mounted.

Profibus DP and CANopen gateways are available for SmartWire-DT in order to implement the data exchange data with the higher-level controller.

CONCLUSION

Kurt Hanke, responsible for electrical engineering – development/design of wood presses at Minda sums up: “Up to six remote operator stations are distributed clearly at advantageous points in our overall system. Each console is provided with an integrated touch display, 10 to 60 indication devices, such as indicator lights, pushbutton or thumb-grip actuated switches, indication contacts of the emergency-stop buttons and an I/O station for non-SmartWire-DT sensors. With a conventional design, a single station requires three to 18 hours just for wiring the sensors. With SmartWire-DT we can reduce this effort by over 60 percent. And where two switch cabinet areas overlap, two SmartWire-DT systems are installed on one control console, in which the “third-party subsystem” is connected to its “mother system” with the required cable transitions.” This saves gateways and ensures optimum utilization of the bus infrastructure. In all, we have reduced working times and costs, thus reducing the overall lead times of the projects.”
China Automobile

SmartWire-DT™ Controls the Transport System in Body Shell Manufacturing

A German premium automobile manufacturer with international operations recently set up a new production line in China. To transfer car bodies to several welding stations, a conveying system had to be developed and integrated into the plant automation structure. Car body production requires the highest level of precision, both in the manufacture of car body parts as well as in the joining of parts at the relevant welding stations. An optimum solution was developed for the project in close collaboration with the Eaton Corporation in Shanghai.

**Demanding customer requirements**

The extensive arrangement and number of signals to be processed from individual stations were a particular challenge to the automation of the car body production line. To ensure the optimum production process, all the motor drives of the conveying system, as well as all the sensors of the relevant welding stations have to be monitored and controlled centrally. The conveying system also had to be tuned to the complex control algorithms of the quality control on the welding stations.

Other requirements: The motor starters had to be implemented as DOL or reversing starters with motor protection for overloads and short-circuits. Contactors and motor-protective circuit-breakers in the rating range from 0.55 - 11 kW were required for controlling over 1200 different drive motors. All status information such as the feedback signalling of the contactors and tripped indication signals of motor-protective circuit-breakers had to be logged centrally. Conventional solutions were ultimately rejected since they required a large amount of installation effort and only offered a low level of flexibility for plant modifications. The project design, installation and commissioning would be too time consuming, even when using remote I/Os. The project therefore required a high-end innovative solution that fully met every customer requirement.

**Highly efficient solution**

Eaton DIL contactors and PKZ motor-protective circuit-breakers were therefore selected for the task. Since the application required auxiliary
contacts with different contacts for interlocking or signalling tasks, the PKZ was ideal with its wide range of approved accessories for the safe and efficient control and management of electronic systems from the xStart range. The motor starter assembly was implemented with tool-less plug connectors. This thus offered two separate contact systems including a visible isolating gap, as well as an unambiguous assignment of PKZ protective device and DIL switching device, which can also be later exchanged on an individual basis.

The innovative SmartWire-DT communication and connection system enabled the automation requirements, i.e. the connection of DOL and reversing starter combination to Profibus DP, to be met with a high level of efficiency. The particular benefit of SmartWire-DT is the fact that conventional switchgear such as DIL contactors can be incorporated in the system, whilst the wiring effort on the other hand can be reduced by more than 60 percent. This project used over 1600 motor starters, and the use of SmartWire-DT achieved a time saving of almost 180 hours compared to the conventional wiring method – corresponding to almost 22 working days.

No special devices are required to make motor starters system compatible. SmartWire-DT modules just have to be snap fitted onto standard motor starters. The SmartWire-DT cable provides both the communication and the power supply to the slaves. Besides motor starters, it is also possible to connect command and signalling devices, soft starters or circuit-breakers to SmartWire-DT: SmartWire-DT also does not require any additional I/O modules and thus saves space in the control cabinet.

The integration to the existing automation structure with S7-400 and Profibus DP could not have been easier: Each SmartWire-DT line starts with a gateway, in this case Profibus DP (alternatively CANopen, Ethernet IP and also other protocols can be implemented). Up to 99 slaves can be connected on a SmartWire-DT cable with a maximum length of 600 m. The number of connectable slaves is thus virtually unlimited. Slave addressing is executed automatically simply by pressing a button on the gateway. In this case, the PLC program stays unchanged. A GSD or EDS file can also be imported without any problem. In all, 720 meters of SmartWire-DT cable were used in this project. Implementing the same project with conventional wiring would require approx. 12,600 m of control cable. Using SmartWire-DT therefore helps us to utilize resources efficiently, thus reducing the impact on the environment.

**Rapid success**

The project design, installation and commissioning of the conveying system with SmartWire-DT proved to be highly successful so that car production in Changchun could already start at the end of 2010. In a further expansion stage, a power management concept with SmartWire-DT is being considered: Eaton circuit-breakers can also be connected to SmartWire-DT and status messages such as on/off signals, trip indications and load warnings logged centrally. Moreover circuit-breakers with remote operators in standby operation can reliably switch off any energy consumer that is not required. An Eaton XMC measuring module can also record essential energy consumption data and make it available via SmartWire-DT.

According to the OICA (International Organization of Motor Vehicle Manufacturers), 77.6 million cars were produced in 2010 (2009 = 61.7 million), an increase of 25.8 percent compared to the previous year. Five countries, the Peoples Republic of China (18.3 million), Japan (9.6 million), the USA (7.8 million), Germany (5.9 million) and South Korea (4.3 million) represented 59.1 percent of worldwide production for 2010 (2009 = 59.3 percent). Other significant manufacturers in Europe in 2010 were Spain, France and the United Kingdom.

**CONCLUSION**

The local project manager responsible at the automobile manufacturing plant was delighted with Eaton’s SmartWire-DT solution. On the one hand, the company was able to significantly reduce the installation time required, whilst SmartWire-DT offered on the other hand considerably more transparency with lower investment costs. Today the car manufacturer uses the SmartWire-DT to access the diagnostics data of every individual slave, thus significantly increasing plant availability. As a result of this entirely positive experience, the automobile manufacturer is also considering the use of SmartWire-DT in the area of power management.
Cooling with Care

Cold Stores for the Long-Term Storage of Vegetables

In earlier times storage pits or cellars were used for the long-term, cool and moist storage of fruit and vegetables. Many food products can be preserved for long periods by means of mechanical cooling in cold storage warehouses or deep freezers. However, this cannot be used for the long-term storage of fresh fruit or vegetables as this has particular requirements. When the air humidity is high and the temperature is low, vegetables slow down their metabolic activity, which means that they can be stored longer. Fieles Dithmarscher Kältetechnik, a company based in Marne, is a successful specialist in the field of refrigeration technology, air conditioning and ventilation, and designs special systems for vegetable storage. At Fieles the control systems implemented for the long-term storage of vegetables are primarily based on Eaton products: Besides HMI/PLCs connected to SmartWire-DT, easy control relays, busbar trunking systems, enclosures, DIL contactors and contactor relays are used, as well as PKZM motor-protective circuit-breakers, RMQ-Titan control circuit devices and EMR safety relays.

The Eaton XV102 touch display PLC is programmed with XSoft-CoDeSys-2.

SmartWire-DT in operation: mounting times are shortened considerably, maintenance and service work simplified.

Remote operator station: XV102 touch display PLC, 5.7”, also with optional web server.
Fieles Dithmarscher Kältetechnik designs and builds vegetable cold storage warehouses including insulated chambers and refrigeration systems for different types of vegetables: Whether for storing potatoes or onions, with a drying unit or cooling device for various applications, such as for sauerkraut (pickled cabbage) or for shipping warehouses, the Fieles systems for agricultural production and sales are used in both Germany and in Eastern Europe. Fieles relies on high quality certified components for use in its plants. The control technology required is therefore designed and manufactured to meet the specific requirements.

Long-term vegetable cold storage warehouse with high functionality

The Fieles refrigeration system used here, built for the H.R. Thiessen agricultural holding in Kronprinzenkoog, consists of two piston compressors, one condenser with three fans, four air coolers (evaporators), each with four fans as well as several valves, regulators and sensors. The interplay of these components ensures a constantly optimum chamber climate so that the vegetables stored can stay fresh for several months up to the next harvest.

In all, the system receives 33 digital data elements and eight analog signals from the system. After processing this information, the controller supplies 31 system components. At the same time, all components are monitored and disconnected individually in the event of a fault. These faults are stored in the system and can be analyzed during servicing.

An Eaton touch display PLC from the XV102 series (5.7 inch) was used, which is housed in the central switching cabinet, and which is connected to a remote operator panel (HMI XV102). The controller regulates all pressure and temperature parameters within the cooling system and ensures regular automatic defrosting of the four air coolers using the so-called hot gas defrosting system with reduced compressor output. This ensures that energy required for the cooling system is used efficiently. The central HMI/PLC XV102 is linked to a SmartWire-DT gateway for connecting the SmartWire-DT communication system to standard fieldbus systems – in this case CANopen.

SmartWire-DT is the seamless connection and communication technology from Eaton and is designed as an open system. The central XV102 in conjunction with SmartWire-DT considerably reduces the wiring requirement, and enables end users to scan all the parameters of the vegetable cold store, thus eliminating the need for several individual control circuit devices or temperature displays.

Michael Gliszczynski, head of the electrical workshop and electrical engineering at Fieles Dithmarscher Kältetechnik, had this to say: “As we only use top quality certified components in our systems, the robust and quality Eaton products were a first choice. Like other Eaton products, the touch panels are connected to SmartWire-DT. Thanks to SmartWire-DT, our construction times have become shorter, whilst maintenance and service work have become simpler. We can offer our customers teleservice options if required. All customers can operate our long-term vegetable store simply – all data/temperatures can be called up directly by touch panel. As touch panels are now available with an integrated SmartWire-DT master, we will be using these in future, thus eliminating the need for another device in the switching cabinet.”

The vegetable cold store: Long-term storage of fresh fruit or vegetables presents particular challenges for the control engineering.
In 1846 the Bichsel family in the Swiss Emmental laid the foundation for a successful milling tradition. At that time corn, oats and wheat were processed into food products. Out of this family-owned business the Kentaur joint stock company grew at the beginning of the 20th century. As the first manufacturer of oat flakes in Switzerland, Kentaur launched a ”ready-to-eat” Bircher muesli on the market. The development to a leading producer of cereal flakes and pops took place gradually. Kentaur relies on the top quality products of Eaton for the new power distribution system in the incoming goods, raw materials processing and waste recycling areas: The good price/performance ratio of their durable products as well as their outstanding services were the reasons for choosing Eaton.

At Kentaur, the constantly high quality of its products and production process is of key importance. The company’s traditional strengths lie in its technologically mature solutions: All plants and machines are selected and installed after stringent examination and testing. As well as featuring state-of-the-art technology, the machines and plants have to be robustly designed and should be easy to handle and maintain.

Swiss-made is a quality standard that Kentaur meets in full. During a routine inspection of the Kentaur switchboards, the heavy current inspector therefore decided that the distribution system for the incoming goods, raw material processing and waste recycling areas needed renewing. This caused Kentaur to choose a new switchboard design that meets the latest requirements of the low-voltage installation standard (NIN) both in terms of personal protection and system protection.

The plant manager Andreas Hebeisen assigned electricians Adrian Schertenleib, Stefan Gerber and Christof Riesen with the task of replanning the power distribution system. The following requirements had to be met: Close compliance with all installation standards, optimum use of limited space and keeping within the
The company: www.kentaur.ch

Products: NZM compact circuit-breakers
PKZ motor-protective circuit-breakers
RMQ pilot devices
PFR residual current relays

Quicklink ID: ES2419 [www.eaton.com/moellerproducts]

The company: Kentaur GmbH, based in Lützelflüh/Switzerland, belongs like the Dailycer Group to DE-VAU-GE Cereals Holding GmbH based in Lüneburg, and is one of the leading manufacturers of cereal flakes and pops. At its Lützelflüh site Kentaur has around 70 employees and processes annually around 10,000 tons of maize, wheat, spelt and rice. DE-VAU-GE Cereals Holding GmbH has seven production sites in Europe and a turnover of around 500 million euros. Its most important markets are Germany, France, the United Kingdom, Spain, Austria and Switzerland.

The consistent use of circuit-breakers instead of fuses in order to reduce downtimes was the first technical decision made.

As Eaton products such as motor-protective circuit-breakers, operating elements and contactors, were already successfully in operation in Kentaur plants and machines, the project managers contacted Eaton. They jointly worked out a solution to meet all customer requirements and standards stipulated. Kentaur then evaluated solutions proposed by competitors.

Eaton was then awarded the contract to provide a solution consisting of various circuit-breakers (NZM1 160A/ 200A/ 250A, NZM2 80A/ 100A/ 125A/ 160A and NZM4 630A) as well as several PFR residual current relays. The customer was impressed by the compactness of the PFR with a design matching that of the NZM circuit-breaker and its functions.

NZM and PFR – compact and easy to install

The Eaton residual current release modules are matched to fit the base of the NZM1 (also on the right of the NZM1) and NZM2 circuit-breakers. These device combinations perform the following tasks: Control and switching of currents up to 250 A, as well as overload, short-circuit and residual current protection.

Alternatively, the modules can be combined with N switch-disconnectors. No external auxiliary voltage is required for this. The residual current protective module of the NZM2 is not restricted by the mains voltage. Customers can choose either pulse current or universal current sensitive models. Three-pole and 4-pole variants with different rated residual currents from 30 mA up to time selective 3A are available for virtually every mains constellation.

In the event of a fault, the RCD switch on the NZM1 first indicates the increasing residual current via an LED. Only when the set residual current is exceeded is the circuit-breaker tripped by the RCD release, thus opening the main contacts. The cause of the trip is indicated mechanically on the NZM1 and NZM2. Users can clip on optional auxiliary contacts which indicate the trip remotely. In order to restore the power supply, circuit-breakers and residual current releases must be reset and reclosed.

The PFR residual current relay with a ring-type transducer is also available. These ring-type transducers are compactly arranged on the cable run and form a functional unit together with the measuring relay that is clipped onto the DIN rail as required.

The new relay/transducer combinations cover operating currents from 1 to 1800 A. The application range covers general power distribution requirements right through to single motor feeders. The residual currents that are detected and processed by the relay are between 30 mA and 5 A.

CONCLUSION

The company electricians Adrian Schertenleib, Kentaur, summed as follows: “At Kentaur several production lines for different processing technologies are in operation round the clock. For example, the cornflakes plant for all cereals, the puffing plant for producing cereal pops, plants for milling (waste recycling) and pealing (raw material processing), flaking and coating as well as packaging plants. For this reason we must be able to fully rely on the quality of the electrical products in plants and in the power distribution systems. The space and the budget available to us for building the new panels for the incoming goods, raw material processing and waste recycling areas were limited. However, we naturally we did not want to forfeit any of the requirements and standards that had been specified beforehand. The employees at Eaton in Switzerland gave us highly expert advice, as well as offering a comprehensive service with very fast response times. A future-proof system for personnel and system protection is now in place.”
Endinet has been part of the Dutch company Alliander since 2010 and manages the power grid in the Eindhoven district. In the past months, the company has started the renovation of its transformer stations. In order to ensure a safe and convenient completion of the renovations, Endinet has been using a mobile transformer station in a container over the past year. The complete transformer station takes over all functions during the renovation phase. Three stations have already been completed and 14 are still due for renovation.

Mobile transformer station: The container houses a 3.6 kV SVS/08 medium-voltage switchboard from Eaton consisting of 17 sections

The grid operators Liander and Endinet, both subsidiaries of the Dutch company Alliander, supply electricity to three million customers and gas to 2.6 million customers in over a third of the Netherlands. Liander has the legal mandate to manage the electricity and gas network and associated installations in the Gelderland, Friesland, Flevoland, North Holland regions and a part of south Holland. Endinet is responsible for the supply in Eindhoven, eastern Brabant and in the Haarlemmermeer district.

Safety and protection

Of the 26 transformer stations that Endinet manages, many were built in the fifties. These are unenclosed medium-voltage systems that no longer match the current state of the art. As Ruud de Mönnink, project manager of this renovation work, explained “There are new and better technologies now, and it is important to renovate these systems to meet work safety requirements.”
De Mönnink does not consider distributing the power through other transformer stations as useful. This is because supply security would not always be ensured. Endinet therefore decided to invest in a mobile transformer station that was integrated in a container by Eaton. The outstanding benefit: The container can simply be transported on a truck and then put into position. It is also mounted on its own extendable supports approximately one meter above the ground.

**Everything out!**

During the renovation the feeder and distribution cables were rerouted to the mobile station in stages. Once the changeover is completed, the renovation is started. Ruud de Mönnink explains: “We can then enter the building safely and remove everything. The complete interior installation right down to the lamps is removed. A new cable vault and a new flooring is fitted. Eaton then installs a completely new SVS System.”

The content of the mobile transformer station is designed to meet the needs of the largest transformer station that Endinet has, and can be used easily as a stationary installation with the final renovation. “We may keep it as a reserve mobile station or use it to support another grid manager,” Ruud de Mönnink outlines the possible future use.

**SVS/08 at Endinet**

Endinet’s mobile station contains an Innovac SVS/08 system with 17 sections, consisting of 3 x 5 cable sections and two connection sections. A DC unit provides the possibility to switch on a safety relay in the event of a power failure. A Halyester distribution board was also installed for the lighting and the wall socket outlets. The remote reading of switch status indications is currently in preparation.

**INFO**

- **The company:** www.nre.nl
  www.alliander.de
- **Products:** SVS/08 medium-voltage switchboard
- **Quicklink ID:** ES2417 [www.eaton.com/moellerproducts]

Alliander N.V., headquartered in Arnhem, Netherlands, has over 2.8 million customers, is the largest operator of power and gas grids in the Netherlands and belongs to the Dutch provinces and municipalities. With a tradition going back over 100 years, Alliander does not sell energy itself but is responsible for the operation and modernization of power and gas grids which are gradually developed into “intelligent networks”. Alliander, the network company with around 6000 employees, is made up of the business units Liander, Endinet and Liandon. The German Alliander AG is headquartered in Berlin and has been operating since 2001.

**CONCLUSION**

“The delivery of the mobile transformer went extraordinarily well,” Ruud de Mönnink, project manager of the renovation work at Endinet, explained. “We are highly satisfied with the quality and processing of both the SVS/08 system and the planning, consulting and service provided by Eaton.” The project manager adds: “The container is positioned neatly behind the site perimeter and takes on all the functions of the transformer station so that the renovation work can be carried out safely. The feeder and distribution cables can be connected without any problem thanks to the mounting on supports. In short, we are confident that we will soon successfully complete our ambitious renovation project.”

**SVS/08 - SVS/12: Modular medium-voltage switchboard 3.6 - 24 kV**

SVS/08 - SVS/12 is a modular epoxy-resin insulated switchboard with a sheet steel enclosure and vacuum interrupters and circuit-breakers. Innovac ensures the reliable switching, measuring and distribution of electrical energy with safe switching components in functional section designs. The modular medium-voltage switchboard, designed for 3.6 to 24 kV, integrates functionally designed sections that are fitted with main components such as circuit-breakers, molded case switches, cartridge holders, measuring sections, main busbars and cable terminals feeders.

The SVS switchboard is ideal for use in switching stations and distribution substations used in utility grids, as well as for industrial applications and public power supply grids. Eaton has a worldwide reputation with its Holec product series as a specialist in the field of epoxy resin insulation. Vacuum interrupters and circuit-breakers are the core components of Eaton Holec switchboards. These high-quality switches were designed and manufactured in-house.
Eaton Technology Road Show Europe
“Solutions from Lean Connectivity to Lean Automation”

From August 2011 to the end of 2012 the Eaton Road Show will be touring Europe and presenting directly to the customer a wide range of innovations for machine building and system building applications. Not only device components but also solutions that offer a considerable value addition for users will be showcased.

The Eaton Technology Road Show Europe will start with a bang and a blaze of product highlights and key technologies, setting benchmarks in efficiency, effectiveness and sustainability, whilst at the same time ensuring a high level of performance, reliability, safety and user-friendliness. An extremely versatile portfolio will be on show, consisting of products and services for power distribution, power quality, and industrial automation for machine building applications for OEMs and end customers. The range includes MSC motor starters, PKE motor-protective circuit-breakers with electronic wide-range overload protection, scalable automation and safety solutions that meet the most demanding requirements, as well as energy optimization solutions including monitoring, energy saving solutions with variable speed drive drives, right through to efficient power quality and also electrohydraulic solutions.

Interested visitors to the Road Show can take the opportunity to get informed in their locality. Information about when and where the Expoliner (240 kW bus, 18 tons in weight, 12 m long and 4 m high) can be obtained from your local Eaton sales offices: www.eaton.eu/electrical/contact

New Eaton Wiring Manual 2011 Available

The Wiring Manual, which has been an established publication for several decades, will be presented in a new and extensively revised edition at the SPS/IPC/Drives 2011 fair. The Eaton Wiring Manual 2011 continues in its successful layout as a pocket book in DIN A6 format and will be presented in the Eaton design. It offers valuable practical tips – for trainees and experienced technicians alike. The following content has been added or updated: Overview of photovoltaic solutions in residential buildings, as well as medium-voltage systems, updated presentation of the xBoard enclosure range, completely revised chapter on SmartWire-DT and automation systems, extended chapter on drive engineering (DS7 soft starter, M-Max frequency inverter, Rapid Link 4.0 decentralized drive system), a thorough description of the Eaton sensors in chapter 3, updated chapter 5 with ZEB motor protective relays, inclusion of the PKE motor-protective circuit-breakers in chapter 6, IZMX circuit-breakers added to chapter 7 and an updated description with technical terms in the chapter “Exporting to the World Market and North America”. Standards formulae, tables and relevant conversion tables complete the range of information on offer.

The Eaton Wiring Manual 2011 – written by specialists for specialists – has been published in printed form in English and German. Interested readers will also find the Eaton Wiring Manual 2011 on the Internet, either as a PDF download (complete or by chapter) or as a flip catalog, as well as part of the Eaton Catalogs App for smartphones.

Quicklink ID: ES2420

Eaton Live:

Germany
06.03. – 11.03.2012 | CeBIT, Hannover
15.04. – 20.04.2012 | Light+Building, Frankfurt
23.04. – 27.04.2012 | Hannover Messe, Hanover
13.06. – 15.06.2012 | Intersolar, Munich
04.09. – 07.09.2012 | SMM 2012, Hamburg
18.09. – 22.09.2012 | Husum Wind, Husum
10.10. – 12.10.2012 | IZB Fair, Wolfsburg
27.11. – 29.11.2012 | SPS/IPC/DRIVES, Nuremberg

Europe
28.02. – 03.03.2012 | Ipack IMA Trade fair, Milan
05.05. – 12.05.2012 | ECC 2012, Biograd
04.06. – 07.06.2012 | Eliaden, Oslo

International
22.05. – 24.05.2012 | Airport Show, Dubai
24.04. – 27.04.2012 | EEM 2012, Moscow
11.06. – 14.06.2012 | Gartner DC, Washington

Quicklink ID: MESSEN
FAX Reply
+49 (0)228 602-2275

☐ Please send me “Solutions“ regularly

Company: ........................................................................................................................................

Name/First name: ..............................................................................................................................

Department/Function: ......................................................................................................................

Street: ............................................................................................................................................

Post Code/Town: ..............................................................................................................................

Country: ..........................................................................................................................................

Telephone: ......................................................................................................................................

E-Mail: ............................................................................................................................................

☐ Please include me in the distribution list for your electronic newsletter.

☐ Please send me information on the following topics

☐ Eaton Industrial Main Catalogue
☐ “From Lean Connectivity to Lean Automation”
☐ XV100, XV150, XV200, XP700 Touch Display PLCs
☐ NZM circuit-breakers
☐ SmartWire-DT
☐ Product information HMI/PLC with SmartWire-DT
☐ xEnergy
☐ Power Xpert CX
☐ Power Xpert FMX

☐ SVS Medium-Voltage Switchgear
☐ Machine building product overview
☐ Moeller is Eaton

Quicklink

Your goal’s just a click away.

1. All texts are provided with a 6-digit Quicklink number.

Quicklink ID: ES XXXX

2. At www.moeller.net enter the required Quicklink number in the entry box at the top right or enter a search term and confirm.

3. This takes you immediately to extensive product information.

Contact

Further information: Up-to-date and fast.
By fax, Internet, email and for download

FAX Reply: +49 (0)228 602-2275
Email: info-int@eaton.com | Internet: www.moeller.net, www.eaton.com
Ordering information: literature.moeller.net
Electronic catalogue: ecat.moeller.net
There’s a certain energy at Eaton. The energy created supports our commitment to powering business worldwide. From power distribution to power quality and control, Eaton allows you to proactively manage your complete power system by providing electrical solutions that make your applications safer, more reliable, and highly efficient. Visit www.eaton.com/electrical.