



Experience Success.

ZENON IN ACTION.



zenon
do it your way

The background features a complex, abstract design. On the left, a series of concentric circles radiate from a central point. Overlapping these are several elongated, rounded rectangular shapes that fan out towards the right. A dense cluster of smaller, overlapping circles is positioned in the center-right area, partially overlapping the larger shapes. The entire composition is rendered in light gray lines on a white background.

Experience Success.

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do it your way.



CARS, MACHINERY, FOOD, BUILDINGS, INFRASTRUCTURE –

each sharing something common and highly effective. That something is zenon. Our HMI/SCADA system is a truly universal tool, a fact that is borne out by the stories in our reference brochure. But that's not all ...

zenon is not only a system suited to a wide range of different requirements, it also combines all manner of different functions in a single tool and in one single development environment. zenon can be used for many different tasks such as control and visualization, communicating and exchanging data with other applications and monitoring plant operation as well as an optimization tool to increase plant productivity and efficiency. All of this can be done with just a few mouse clicks.

zenon will run on any of the current Windows operating systems. In combination with straton, zenon provides a fully-integrated soft PLC and SCADA logic system that interfaces with virtually any hardware. It supports over 300 communication protocols as standard, and our engineers will write additional protocols on request at any time. zenon also exchanges data with other applications and links directly to the ERP level. All this, needless to say, is carried out on a network, configured for multi-user operation, across all departments in a company, and conforms to the US FDA 21 CFR Part 11 standard. As for configuring zenon... well, all it takes is a few minutes and a few clicks of the mouse.

As you can see in our Reference Brochure zenon has been deployed in a wide variety of applications in a large number of different industries. You will see zenon being used for control and visualization, often with multiple monitors. You will also see zenon being used for plant analysis and optimization. All of these applications use many different interfaces and communication protocols. The common factor in all of these applications is the ease of use and deployment even for very complicated and complex systems.

We would like to thank each of our customers who have participated in sharing their experiences of zenon with us.

Welcome to the world of zenon.

Yours

Thomas Punzenberger (CEO)



zenon controls bale finishing line.

The international technology group Andritz (Austria) is the leading provider of process equipment. Amongst other systems, Andritz successfully delivers cellulose processing lines (bale finishing lines) around the globe. The software package zenon from COPA-DATA, of Salzburg, was chosen as the HMI/SCADA system, a good start for a long-lasting successful cooperation.

BALE FINISHING SEEKS VISUALIZATION

In the beginning of 2005, Andritz began to look for a new software platform for the consistent control of all their bale lines. The legacy visualization package having reached its limits.

A project of this size is a real challenge for automation providers, especially in the HMI/SCADA technology field. There were special requirements in order to provide a successful "Balematic system" for bale finishing lines. Just a few of

the many requirements that needed to be fulfilled, included:

- ▶ reliability,
- ▶ decentralized intelligence,
- ▶ compatibility with Windows CE to XP, and
- ▶ full integration of all systems from the terminal to the control room.

Andritz researched the HMI/SCADA market carefully, as the previous tools were not able to fully meet their complex demands. However, it was not only all

about the system's functionality, it was equally important for Andritz to find a reliable partner, a partner that would enable Andritz to keep its position as world market leader and to be able to deliver continuous innovation to the market. Andritz chose zenon, the independent HMI/SCADA system by the software innovators COPA-DATA in Salzburg. The first experience with the systems turned out to be very satisfying and zenon has now been in use for all applications in the Pulp & Paper/BaleMatic™ systems since 2006.

Gerhard Schiefer, head of the engineering and software group of Andritz Automation in Graz: "We created a very demanding catalog of requirements for our new HMI/SCADA provider. We wanted perfect integration, system independence and a top product based on the latest technology – and of course, we were also looking for mutual understanding and synergy. We were looking for a partner that we could rely on. As it turned out, it was the right decision to choose COPA-DATA."

INDEPENDENCE WANTED

zenon even in its basic form has the features that meet some of of Andritz' most important requirements: independence and continuity. zenon works with all current Windows operating systems – from CE to XP, Vista and Server 2003/2008. It is also the first HMI/SCADA software package to be "Certified for Windows Vista", supporting all the new security features of Windows Vista without constraining users. zenon's scope guarantees full compatibility from the terminal to the control room.

zenon reduces engineering times with intelligent features such as automatic engineering with intelligent wizards for the efficient reuse of sections of existing projects. These features also convinced Christoph Sedminek, project manager from Andritz software engineering: "In modern production sites, it is essential to always have the latest technology. Fast information flow ensures efficient and effective work. The continuity of zenon, i.e. the ability to create completely platform-independent projects, gives us the freedom to engineer and structure our systems as we prefer."

zenon also delivers complete hardware independence. It comes with over 300 drivers, connecting to any hardware without problems. Andritz can use any type of machine without worrying about connectivity. zenon gives full freedom of action and allows Andritz to use the best technology available in each part of the system and to integrate them seamlessly to provide a complete solution. zenon also has sophisticated network functionality. A fully operable zenon network can

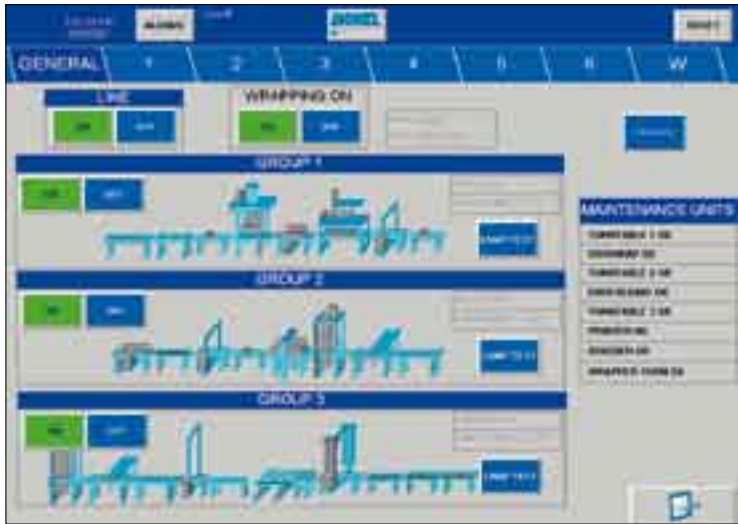
be established with a few mouse clicks in just a few minutes. Several users can work on one project and maintain and update it online, even if the machines are on a different continent. This can all be done without interruption because zenon can update projects without the need to stop machines.

Besides the sophisticated network technology, Christoph Sedminek appreciated the openness of the zenon PLC connectors: "Andritz delivers products around the world and our customers have very different requirements. In South America, for example, we have many Siemens S7H PLCs. Other customers prefer Allen Bradley, yet others prefer B&R. The modular structure of zenon is the key to its success."

OVERVIEW RAISES PRODUCTIVITY

Those who prefer to be proactive rather than reactive need an overview of the production data and information and their interrelationships. In order to run large-scale production processes like pulp





mills at a high level of productivity, the operator must be able to evaluate data in real time and also keep an overview of historical events. For that, zenon not only provides powerful archiving and analysis tools; it also lets ERP systems, such as SAP, access its database without hindrance.

Stefan Reuther, sales manager at COPA-DATA says: “Cost pressure and fast innovation cycles require safe and flexible solutions that are state-of-the-art. zenon gives users a detailed overview of all processes. With its integrated seamless redundancy, zenon guarantees that this clear overview is never lost and the plant always stays operable.” Andritz is already using zenon for other applications besides bale finishing. As a global player, Andritz implements projects in many different markets worldwide. The many intelligent functions and wizards of zenon make it easy to complete projects in a fast and efficient way. For example, zenon’s on-line language switch allows project engineering in one language and execution in any other language. Engineers, commissioners, operators and maintenance staff

can always switch to the language they prefer: an indispensable function – especially for international companies. Also indispensable for Andritz is zenon’s ability to transfer complete projects to other systems with a few mouse-clicks and then maintain them easily from afar. The team at Andritz have been convinced by zenon’s powerful functions. After all their positive experiences, they have decided to update to zenon 6.22 to benefit from the features of the latest version.

ZENON 6.22

With its latest zenon version, COPA-DATA sticks to its philosophy of flexible independence and certified security. For several years, zenon has been fulfilling various security regulations such as FDA and various European regulations. Additionally, operators profit from zenon’s operational security in runtime.e.g. the clear structure of the alarm lists.

Alarm lines can be highlighted with colors or grids. There is a separate column acting as an “alarm signal light” that shows the status of every alarm at a glance, with

freely definable colors. Operators immediately see the alarms that need their attention. This reduces the cognitive load, reducing errors and costs and minimizing the effects of downtime. zenon’s wide range of functions for remote access delivers speed and convenience. Whether Remote Transport, Web Server, Remote Desktop or Web Access, its functions save operators and developers much time and effort during commissioning and maintenance. The integrated Remote Engineering module establishes connections to remote machines displaying the target screen displays on the Engineering system. This allows you to easily process messages delivered by the operating system of a remote device on your own computer. You can also reload projects online or transfer projects without the need to restart.

The user can choose how he wants to connect to the target device: in the classical way, with a direct network connection via the zenon Remote Desktop, or with a web browser via the flexible zenon Web Access. Web Access uses a standard web browser and enables computers without zenon installed to access other machines.



The approved Web Server (a very secure client-server application) even gives access to zenon from outside the network. This can be used, for example, by an administrator to check alarm messages from his home computer. Or maybe an operator wants direct access to a station that is located on a different continent.

All of these features provide essential advantages to companies like Andritz who deliver powerful solutions to companies around the globe. Remote systems can be maintained and updated in real time, with significant reduction in support costs

PARTNERS FOR PERFECT AUTOMATION

Andritz and COPA-DATA are two ingenious partners who have found each other.

Both companies are striking new and creative paths. Both companies rely on sophisticated and easy-to-use technology.

The success story of the Andritz group begins in 1852 in the small village of Andritz near Graz, where the Hungarian immigrant Josef Körösi established an iron foundry. Today, the listed Andritz group employs about 12,000 people in over 35 production plants and service facilities and has over 120 subsidiaries and sales offices worldwide.

The Andritz group is one of the leading vendors of customized lines, systems and services for the pulp and paper industries, the steel industry, hydroelectric plants plus other specialized industries (solid/liquid separation, animal feed and biomass).

COPA-DATA has been known as the innovation leader for HMI/SCADA software for 20 years. With zenon, COPA-DATA introduced the first graphic visualization system to run completely under Windows. Many companies worldwide, from diverse industries like automobile construction, plant construction, food & beverage or energy management, enjoy the advantages delivered by the hardware independent and flexible solution zenon.

The new generation of bale finishing lines was successfully launched around the globe. Andritz is the market leader in this area. However, Andritz and COPA-DATA are not resting on their laurels. They are already working together on future projects.

zenon, a future-proof solution – efficient, flexible, easily integrated.

Sasol, an international player in the oil, gas and chemistry industry, uses zenon for its pipeline system in the German factory in Brunsbüttel. The innovative solution controls the lines and valves in the pipeline network, ensuring the flexible and reliable transport of alumina products.



The factory in Brunsbüttel employs 520 people and is a modern and important production unit for the Sasol group. Thanks to excellent infrastructure, the location is also perfect for future growth. Technological progress, new developments and the use of modern technologies is day-to-day business for this global player in the chemistry industry. Manfred Rohwer explains SASOL's philosophy, "We see change as a chance for constant improvement". Rohwer manages the department for electronics, measurement and control. The Sasol group is a South African company with 30,000 employees worldwide and a sales volume of about 10 billion US dollars.

In Germany, Sasol produces raw materials for detergents (tensides) and fatty alcohols, ethylene oxide and alkyl phenol, as well as solvents, waxes and oleochemicals. In Brunsbüttel, Sasol produces fatty alcohols, their derivatives and special anor-

ganic chemicals, such as high purity alumina. Alumina is required for the production of refining and chemical catalysts, it helps with cleaning automobile emissions and it is used for the production of heavy-duty plastics (for example, for use in the aviation industry).

FOR A SUCCESSFUL FUTURE: MODERNIZING THE INFRASTRUCTURE

Sasol has a pipeline system with about 300 valves for routing alumina and chemicals in the alumina halls in their Brunsbüttel factory. This resulted in a total of about 200 different paths of getting from the source to the required destination. The existing process control system was used for routing control. All function blocks were developed by Sasol employees. Because of the distributed structure of the process control system the valves were

connected to different process stations. The cross-communication required by this structure resulted in high network loading and performance restrictions.

In order to improve the existing infrastructure, and at the same time increase flexibility, Sasol looked for a flexible control system that could also be extended in the future. Keeping the routing control unchanged after extending the system would not have been possible. Jörg Brouwer, in charge of the process control system at Sasol, decided on a new approach. The task of finding and evaluating a new solution for routing control was posted as a diploma thesis. The interaction of the new superordinated system for the control of routes OPC. The OPC interface ensures the smooth exchange of information between different control components. The diploma thesis was undertaken in cooperation with the University of Applied Sciences in Hannover: Kamil Janus was supported in this project by Professor Rüdiger Kutzner and Jörg Brouwer of Sasol.

ZENON AS THE OPTIMUM SOLUTION FOR TRANSPORT CONTROL

After extensive market analysis, Manfred Rohwer and Jörg Brouwer chose the software package zenon from COPA-DATA. zenon is now used in the alumina production area. zenon supports the flexible transport of alumina products that have to be delivered from the source to the destination while going through storage, processing and packaging. Now, Sasol uses two redundant zenon operating stations in a central control room ensuring high availability routing control. There were many reasons for choosing zenon:

- Sasol needed a modular solution that would be easy to extend



- the intuitive zenon development environment allows for flexible, quick engineering and implementation of new software components,
- zenon has an integrated soft PLC - straton
- the comprehensive support provided by COPA-DATA.

AUTOMATED ROUTE SELECTION SAVES TIME AND GIVES A BETTER OVERVIEW

With the new routing control system, users can now configure 665 different paths. At the same time, they always have an overview of the status of every path. As zenon communicates with the process control system, via the OPC interface, which also allows for the manual control of each valve, zenon must be able to quickly react to all inputs. This task is performed by the straton programming system, which is integrated with zenon. The sequences developed within straton react to all possible states of the routing control system. "The control system we were using required a lot of maintenance. At the same time, we could not extend the system as we wished to", Jörg Brouwer explains. He states that the process stations and the system bus experienced such a high load that switching actions would sometimes take more than a minute with the old control system. "Now, the switching actions are limited only by the speed at which the valves can move. Users can now react really quickly and easily to all events and situations." At the same time, the operators can still manipulate the valves with the process control system. "This allows us to act faster and more flexibly."

The application of zenon with straton by SASOL demonstrates the effectiveness and flexibility that this combination provides; improving plant operation and providing a reliable and expandable solution.



Complex plants clearly visualised.

The world steel market grows on average by just under ten per cent per year, and therefore demand increases accordingly for steel producers like ArcelorMittal. In order for the company to benefit from these positive changes it is all the more important that production should run smoothly and round the clock.

ArcelorMittal is based on a site of around seven square kilometres next to the Weser River in Bremen, where it has been producing steel since 1957. This integrated steelworks includes plants for all production steps from pig-iron production to thin sheet metal. The company produces exclusively sheet-steel products and today includes a blast-furnace plant, an LD steel-works, a continuous casting facility, a hot-rolling plant, a cold-rolling plant and two galvanising plants. At present this Bremen steelworks employs 3,600 people, and the production target for the current year is 3.2 million tonnes of steel slabs. In addition to its steelworks in Germany, this international group is represented in more than 60 countries, employing a total workforce of around 310,000. The company achieves a turnover of around 70 billion Euros and commands a share of around ten percent of the international market.



MODERN GALVANISING PLANT – HOT-DIP GALVANISED STRIPS IN A NEW DIMENSION

BREGAL (Bremer Galvanierungs GmbH) was founded in 1993, and belongs to the ArcelorMittal Group. It is responsible for hot-dip galvanising the cold-rolled thin sheet. BREGAL is one of the most modern galvanising plants in the world, and all its products are supplied to the automotive industry.

The galvanising procedure is as follows: two decoilers and a welding machine are combined to form an endless belt in order that the plant can be operated continuously. The process section itself comprises a strip cleaning station, a continuous furnace, a melt – a device for adjusting the zinc coating, and a cooling station. The continuous furnace is subdivided into a pre-heat zone (450°C), holding zones (800°C) and a cooling zone. In the cooling zone the strip is cooled down to a temperature close that in the melt. The strip is immersed diagonally into the melt (temperature with zinc is around 460°C), then it is turned in an upward direction by a roller in the melt, and passes out of the melt again. The melt-immersion-refined steel strip is dressed and aligned. After this, the strip is wound back into a coil. Depending on the thickness of the strip, it can reach a speed of up to 180 metres per minute.

The corrosion-resistant sheets are produced in the galvanising plant to a maximum thickness of 2.8 mm and a maximum width of 2,080 mm. As well as products with a conventional zinc coating, significant quantities of material with a ‘galvan-nealed’ coating are produced (zinc/iron alloy). Surface quality

is monitored continuously by an automatic surface inspection system. The galvanising plant includes an inspection system for checking the material and its quality, and other systems for air conditioning, cooling water, hot water, ventilation flaps in the roof/wall and, last but not least, a waste water system.

ZENON HAS BEEN LEADING THE FIELD

Since 2003 ArcelorMittal has been converting its steel galvanising plant step-by-step for visualisation, and zenon is the software it has been using for this purpose. The software that had been used for visualisation on these plants up to 2003 was withdrawn as no successor product was announced. What’s more, the repair costs that were incurred as a result of using this software were huge and its design was inflexible – no longer capable of further development and costly to modify. This fell a long way short of the criteria set by the management team at ArcelorMittal Bremen for stability, compatibility and future viability. At the end of a thorough evaluation process Josef Vallant from the electrical maintenance team consulted with his colleagues, and the decision was taken to opt for zenon software. This team was hoping to find a system that would be neat and compact, easy to integrate and straightforward to operate. “zenon (version 6.22) is a server/standby system that has been carefully designed and is easy to configure. It is also quite intuitive to program”, explains Josef Vallant. Vallant talks about its impressive flexibility thanks to the integration of VBA, and also stresses its excellent driver interface via an Applicom card



and OPC server/client. Another important issue for the team from ArcelorMittal Bremen is that there is a well thought out and, above all, customer-oriented upgrade strategy. Josef Vallant explains: “We don’t change our software version every time there’s a new release or update. The compatibility of the latest version with all earlier versions is therefore vitally important to us. It is every bit as important as the facility to incorporate all kinds of different control components, some of which may be quite old, into the overall solution.”

COMPLEX PROCESSES VISUALISED IN A WAY THAT IS THOROUGH AND WELL THOUGHT THROUGH

The inspection system with its two servers (standby and duty) and three clients was the first to begin operation with zenon back in 2003. Later the same year the galvanising plant, which also had two servers (duty and standby) plus 18 clients, was visualised. ArcelorMittal Bremen uses both Simatic S5 and Simatic S7 PLCs, which are linked either via an H1 bus or TCP/IP. The galvanising plant, comprising eight projects plus an umbrella project, is visualised on more than 250 displays containing approx. 33,200 variables. The team at ArcelorMittal Bremen has defined the visualisation of the strip cleaning, the zinc stripping device and the data from the process control system as projects. There were further projects for secondary systems such as wa-

ter circuits, ventilation flaps, a temper pass agent conditioning system, a project for the waste water system plus the overall galvanising plant, and a mini diagnostic tool. Other projects are the central control module for switching control, the visualisation of error messages, and the inspection system. The visualisation now provides the operator with an extremely detailed view of all the components in the system at all times. This applies across the board, from the production sequence in the infeed and continuous tracing of the coils (strip rolls) to the plant and transfer to the high-bay warehouse. All the requisite target and actual data for each coil is always available such as, for instance, which components (welded sheet metals) it contains. At a more detailed level, the user or maintenance engineer can also organise the display of the flushing circuits or even the speed of the individual brushes in the pre-cleaning or main cleaning cycles. At the same time target and actual values are shown at all manner of different locations in the systems, for instance values for the degree of temper rolling (percentage thickness reduction of the sheet). Values can also be adjusted following the input diagnosis. For example: in zinc stripping, if the coating is too high or too low, then the pressure target values must be corrected in order to control the amount of zinc on the metal sheets. The whole system is extremely carefully thought out, with finishing touches like a built-in Wiki for operators. A Wiki is a public-access page or website that can be modified by any user or visitor,



or by a pre-defined set of users or visitors. “Wiki” is a term derived from the Hawaiian word meaning “quick” – a place where information is made available and updated quickly. The best-known Wiki is the online encyclopaedia Wikipedia. “Since the systems and the visualisation software are both extensive and complex, we believe there is a need to provide a knowledgebase for staff to ensure that everyone can obtain information about the system components and the processes at any point in the system”, explains Josef Vallant. The Wiki encompasses not only background information and basic explanations, but also news, for instance on all aspects of waste water disposal.

EXCELLENT LEVEL OF SECURITY IN MULTI-LAYER OPERATION

Since operation in the galvanising plant needs to be safeguarded 24 hours a day and 365 days a year, it was decided to bring zenon in and run the test phase in parallel with the preceding solution from staten. The integration phase went smoothly, just as operation now runs; thanks to the redundant configuration operation is now comprehensively safeguarded. The electrical maintenance team has implemented the system with no assistance of any kind, but nonetheless Josef Vallant is extremely positive about the cooperative working relationship with COPA-DATA: “Along with the technical solution itself, support from the company was equally important to us, both in the course of configuration and

in everyday operation. COPA-DATA is one-hundred percent dependable in this respect. Any query – be it directed to the managers in Munich or Cologne – receives an immediate and professional response, and every problem is solved.”

GALVANISATION MADE TRANSPARENT

Another advantage to the zenon automation system: Arcelor-Mittal benefits, thanks to the visualisation module, not only from a consistent, uniform presentation of all processes, but at the same time has the opportunity to request diagnostics for the system with all its components to enable it to respond rapidly to all manner of events. For ArcelorMittal this includes the so-called “mini diagnosis”, which indicates amongst other states whether the plant is ready to start up, whether a roller or roller cleaning device is out of position, or whether a light barrier is not working. In addition there are the conventional error messages that are sent to zenon with a time stamp from the S7 PLCs via TCP/IP. Josef Vallant stresses: “The diagnostic possibilities – including remote diagnosis – automatically reduce the maintenance costs. But it is not only diagnostic facilities and error messages that provide greater transparency, there is also the Extended Trend. This zenon module takes advantage of Arcelor-Mittal to gain a detailed overview of the information whilst the system is operational, for instance in order to check the fill level in the zinc pot.”



Circular redundancy safeguards steel production.

As far as high-quality rolled steel is concerned, the steel producer Ferriere Nord SpA sets great store by dependable production processes, regulated safety and high availability in its plants. The company is a steel producer based in northern Italy, and it has carried out an ambitious project to create state of the art automation systems. For the purpose of process control the company opted for COPA-DATA and its zenon visualisation system. zenon's circular redundancy ensures that data is acquired continuously, thus ensuring reliable production. zenon has also enabled plenty of long-term aspirations to be realised, and functions that were lacking in the past have now been easily added on.

The Pittini Group has been part of the history of the steel industry in Italy for generations. The largest company in the Group, Ferriere Nord SpA, is based in Osoppo in northern Italy. It comprises an electric steel plant, a wire rolling mill, a rod rolling mill and production facilities for reinforcement steel meshes and grid fencing for the construction industry. All the steel products it produces are first-rate in terms of elasticity and safety standards. They are ideally suited to applications where high quality is a requirement, such as construction of roads and houses.

CONVERTING SCRAP AND CAST IRON INTO HIGH-GRADE STEEL

The production of rolled steel is an extremely challenging process requiring large amounts of energy. Production plants must be controlled and monitored with great precision. The raw material used is scrap metal. In combination with a number of other substances, whose role is to lower its melting point, the scrap is fed into the main furnace. A system of electrodes raise the temperature to melting point. Ladles are then used to move the metal to a second furnace, the refining

furnace. This is where the refining processes take place, cleaning and refining the material through the addition of other metals. The ladles are then passed on for the actual production of rolled steel.

Ferriere Nord has resolved to thoroughly update its automation systems by 2011. This affects all the steps in the production process as well as the majority of components, from machinery right through to software. The automation system has already been upgraded by RB Automazione, using technology from COPA-DATA.

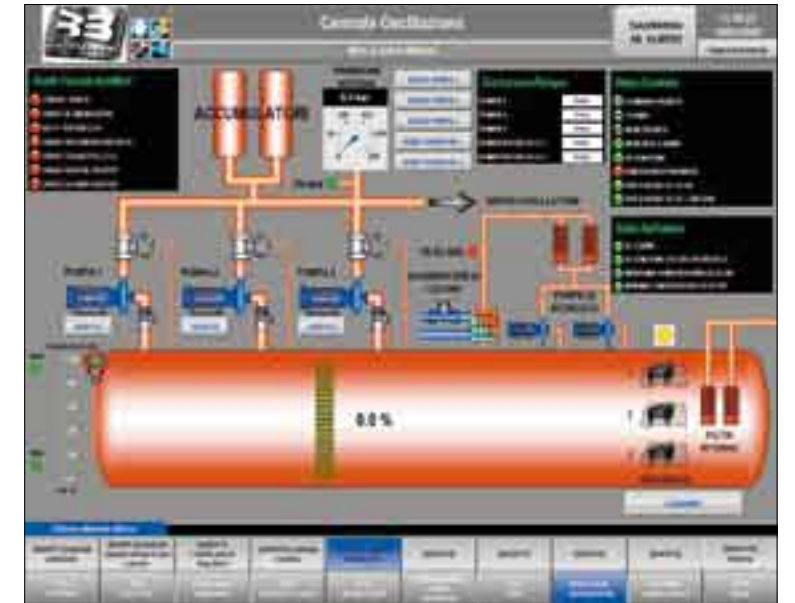
CIRCULAR REDUNDANCY SAFEGUARDING THE SYSTEM

The plant for producing rolled steel consists of three linked systems: the main furnace, the ladle furnace and the continuous casting machine. Each of these three systems is controlled by a server. Ferriere Nord's previous control system did not operate reliably. Furthermore, maintenance tasks carried out from a PC frequently resulted in lengthy downtime for the plant, and if the server failed, data would inevitably be lost. The highest priority for managers on the technical side at Ferriere Nord was to significantly increase

availability of the production plant. The aim was for the new system to make secure data available to users at all times without having to double the number of computers. This was where zenon, with its circular redundancy, entered the frame. This SCADA system from COPA-DATA is based on client-server architecture, and is capable of networking servers using circular redundancy. Each computer doubles up as a stand-by for another computer. In this way only three PCs are needed to implement a secure system with circular redundancy.

"We were looking for a solution that would ensure that systems would be safeguarded in the event of failure and could guarantee uninterrupted data acquisition without increasing the number of components. zenon has enabled us to create a system based on circular redundancy between the servers that significantly reduces both the failure risk and maintenance costs", explains the electrical maintenance and automation manager from Ferriere Nord.

The network linking the three servers is especially fast, and has been reserved for data traffic between the servers. There is thus no risk of delays. This solution, implemented using zenon, controls a total





of 16,000 tags: 8,000 for the main furnace, 4,000 for the ladle furnace and 4,000 for the continuous casting machine.

CLIENT WITH DOUBLE MONITOR

There are eight zenon clients running with the three servers: 2 in the continuous casting machine, 2 in the area containing the ladle furnace, and 4 in the main furnace. One important strength of the new clients is their ability to work with two monitors: you can decide whether to show the same display or two different displays on the two monitors. This was an important factor for the management team: “This facility is very important to us as it enables us to visualise a larger quantity of information for each client at the same time. This makes our staff’s work a great deal easier.” The data for visualisation originates from a number of field controllers. The continuous casting machine incorporates one S5 135 Sinec H1, six S7 400 RFC1006 TCP-IP, six C7 with Echolink and one S7 300 RFC1006 TCP-IP. The ladle furnace has two S5 135 Sinec H1s. The main furnace, on the other hand, has two S5 135 Sinec H1s, three S7 300 RFC1006 TCP-IP and one S7 400 RFC1006 TCP-IP.

Since zenon supports communication based on the TCP-IP protocol, the automation project can be updated very easily, and it is also straightforward to link the servers, clients and PLCs together.

SIMPLIFIED MAINTENANCE

With zenon’s redundant architecture, each server controls its own section whilst at the same time acting as a backup server for another section. This configuration ensures that in the event that one server fails, another one will take over its functions. As a result, costly interruptions to the process are avoided.

System maintenance is also simplified: “If you have restored the functionality of the faulty server, or have replaced that server”, explains Roger Bogna, owner of the system integration firm RB Automazione, “the machine can be quickly reintegrated into the circular redundancy, and the clients can resume communication with their main server.”

The fact that the TCP/IP protocol is supported represents another advantage in terms of system maintenance. “With zenon it is possible to transfer project changes direct from the development site to the runtime server using the TCP/IP

protocol. The data – which is constantly synchronised between the servers – is updated and automatically forwarded to the clients”. This enables the project to be controlled remotely: the system integrator, RB Automazione, can access the system using a remote computer and make changes to the program online via an internet connection. The customer thus saves both time and expense.

Roger Bogna is also happy with the technical support provided by the experts from COPA-DATA: “The technical support, which COPA-DATA guaranteed they would provide, was outstanding. From our point of view as the system integrator, support is vitally important”.

IMPROVING PERFORMANCE AND FLEXIBILITY IN THE VISUALISATION MODULE

“With the old system we had a problem with visualising the trends from one of the two furnaces in real time because the data simply took too long to capture and process. zenon, on the other hand, works very fast. Thanks also to the fact that data is updated at a high frequency, it can deliver the trends we want in real time”, explain Ferriere Nord’s managers happily.

Users can also choose exactly which variables are to be displayed. They can add any variables they like, they can exclude others, and they can change the colours, etc. As soon as the visualisation mode has been defined that best corresponds to the specific requirements, it can be saved in a profile and retrieved at any time with a simple mouse click. In many different situations zenon exhibits excellent flexibility, even when working with historical data. In this case, zenon’s Extended Trend facility proves especially useful. This allows historical data to be managed in the form of a table using the report generator.

PRECISE CONTROL OVER ENERGY

Energy charges represent an important cost factor in a production plant. The ability to control energy consumption accurately is therefore of key importance. zenon provides a module for controlling energy consumption in the shape of its Energy Management System (EMS). This

module monitors consumption in real time and predicts the trend for the next 15 to 30 minutes. Contracts with grid operators define specific windows for consumption, and it can become costly if consumption fails to be kept within these windows. EMS enables a strategy to be designed and implemented to manage the use of energy and to prevent the agreed supply from being exceeded. This system is valued particularly where production is organised in so-called production islands and where the sequence of frequency-dependent load shedding can be programmed. In this way blackouts can be avoided, and the most important machines in the plants will continue to operate.

However, it is not always ideal or even possible to program load shedding or the shutdown of an entire production section, which is very advantageous to companies like Ferriere Nord: “In our case, load shedding and the associated shutdown of the plant would prove very costly. Our preferred approach was to renegotiate

the tariffs with the grid operator. We are now no longer obliged to remain within a specific consumption window, but instead merely to maintain a certain balance to our consumption throughout the day. Even so, we still find it very useful to keep our consumption under control at all times.”

TARGET ACHIEVED

Ferriere Nord has achieved the targets it set itself in terms of reliable plant management: increased reliability, data security and continuous operation even in the event of server failure. zenon ticks boxes with its circular redundancy, data backup, less time-consuming maintenance schedule, simultaneous display of two screens for each client, flexible trend configuration and smooth transition from Windows NT to Windows XP. zenon performed superbly both in terms of accuracy and speed: “Redundancy has been implemented quickly and easily, and the configured system works extremely reliably.”

“The technical support, which COPA-DATA guaranteed they would provide, was outstanding. From our point of view as the system integrator, support is vitally important!”

ROGER BOGNA, OWNER OF THE SYSTEM INTEGRATION FIRM RB AUTOMAZIONE



Seamless electroplating at Collini.

Metal refiner Collini in Vorarlberg, Austria, is one of the biggest refining companies in Europe. When they planned the supervisory control of an electroplating system, they looked for a strong partner that would fulfill their demanding requirements. They found one in experienced system integrator Protec, who tailored a future-proof solution with the zenon process control system by COPA-DATA – including a direct connection from Collini's SAP® application to the process.

DIRECT CONNECTION OF ERP TO SCADA?

Protec was given a long list of requirements: It started with the design and engineering of all the site electrical equipment and the zenon supervisory process control visualization for operating the system. Production data was to be transferred directly from a SAP application at the ERP level to the SCADA system. As an additional process data acquisition task, all production data was to be measured and logged. Collini attached great importance to guaranteed data security and operational availability through the use of a redundant system.

ZENON REFINES PROCESSES IN ELECTROPLATING SYSTEM

The barrel plating system at Collini was designed and engineered down to the last detail. zenon is the heart of the system, providing redundant central process visualization with continuous data synchronization utilizing zenon's built-in circular redundancy. Alexander Ettinger of Protec: "With our multi-faceted knowledge of machinery construction and COPA-DATA's software expertise, we developed a solution using zenon that met Collini's requirements exactly."

zenon establishes a direct connection to the SAP application via a standard interface and gets its production data from it. While the truck is still arriving with the raw materials, the SAP system already has basic data such as lot number and article number and assigns them to the appropriate production processes. For this purpose, it combines data from 7 recipe groups, each of which has a hundred recipes.

All that the operator has to do now is read the lot number of the raw materials with a barcode scanner. It is then automatically compared with a table that is held on the server. This is where zenon gets its production data from. The zenon operator then checks the data, confirms that it is correct and then zenon automatically sends it directly to the PLC. During the refining process, all relevant data such as temperatures, currents and pH-values are logged. This records which lot part was processed where, when and for how long. zenon sends selected production data directly to the SAP application, thereby keeping the SAP information up to date in real time.

FLEXIBLE ZENON

Owing to its open interfaces, zenon was perfect for the solution proposed by Protec. Alexander Ettinger: "We were able to use standard interfaces for connecting to SAP, which saved us a lot of detours and additional programs. We were particularly impressed by the huge amounts of data that can be processed directly via the SAP application and by the reliability of the archiving function. Ultimately, we store about 2GB per year in the zenon file format."

The Protec engineers benefited from zenon's ease-of-use engineering. Since the system was launched in summer 2003, a number of changes and optimizations have become necessary.

zenon made it easy to implement these changes in a fast and secure way.

It is very easy to enter recipes and target values in the object-oriented HMI/SCADA system, zenon. Its sophisticated alarm management and archiving functions make processes secure and always under control. Data recorded during production is available as trend curves and as numerical values, creating an exact overview. This way, each lot is fully traceable. COPA-DATA product manager Reinhard Mayr: "The open design of zenon allows communication with many systems. We can directly address SAP applications via different interfaces. Since summer 2008, we also have a certified bidirectional interface – no additional software is required".

SECURITY MATTERS

For sensitive applications such as electroplating, fail-safe reliability is of vital importance. This is where zenon's circular redundancy® comes into play. With a few mouse-clicks, users can turn nodes into application servers and standby-servers. If one of them crashes, the standby-server takes over its tasks without loss of data. Alexander Ettinger: "Another useful zenon feature for us as integrators is the remote maintenance of SCADA and PLCs. We can use a secure connection to access our system at any time, without any time lag." Protec has used zenon to create a solution that meets Collini's specification exactly – including functions for process data logging and production data acquisition (PDA) as well as an SAP interface.

Kurt Klien of Collini: "With its openness, zenon gave us the flexibility we were looking for. At the same time, it is secure and makes our production fail-safe, and it gives us a perfect direct link to our SAP application."



Lafarge Perlmooser upgrades transport system

Cement and environmental protection sounds like an unlikely combination, but it is a perfect partnership at Lafarge Perlmooser, where used tyres are used as an alternative energy source for cement production. Controlled by straton and zenon, the completely renewed tyre transport system supplies the rotary furnace with about 25 % of the fuel required per hour.



Lafarge was founded in France in 1833. Today it employs 71,000 people in 70 countries. Perlmooser Zementwerke has been a 100% subsidiary of the Lafarge group since 1997, operating under the name Lafarge Perlmooser GmbH.

ENERGY FROM TYRES

Cement plants have a great potential for substituting normal fuel with waste materials. Using alternative fuel for cement production saves natural resources and reduces CO₂ emissions. Lafarge Perlmooser protects the environment and saves resources in many ways, one of which is by using used tyres as fuel. MGX Automation was commissioned to

renew and upgrade several parts of the plant. The objective was to reduce operating costs and increase production output. An important subproject was renewing the tyre transport system.

Wolfgang Luger, head of the project department in the plant at Retznei: "We replaced about 25 % of the fuel required for our rotary furnace with used tyres. In the autumn of 2007, we decided to completely renew the electrical equipment and automation of the used tyre system. Above all, we wanted to enable our operators to solve transport problems with as little travel as possible. Until now, solving such problems was a labor intensive task as it involved travelling long distances."

A PERFECT TEAM FOR SMART SOLUTIONS: STRATON AND ZENON

On the way to the furnace the used tyres are first picked up by an automatic crane that places them on to a slat conveyor. From there, they are moved through a separating system where they are analyzed and separated by a laser scanner. The scanner system transfers the collected data via Modbus TCP to straton. In the same way, straton sends target values to the system, which then checks tyres for parameters such as maximum diameter or the presence of rims. Tyres matching the requirements are conveyed through a weighing station and then into the rotary

furnace. For this the transport system, a total of 30 inverter drives, for the slat conveyors, roller conveyors and conveyor belts, had to be connected to the PLC via Profibus DP. The electro-mechanical design was completely changed and the MCC, Motor Control Cabinets, and the inverters were placed directly by the motors. MGX Automation chose the zenon HMI/SCADA system as the redundant control system. straton was chosen to control the WAGO and Siemens slaves. straton and zenon are very open and allow easy communication with existing automation components via protocols that include Profibus DP, Modbus TCP and IEC 60870-5-104.

straton also interfaces with the WAGO 750/753 field bus nodes and the Siemens ET200S, which has been in use at Lafarge Perlmooser for a long time. This degree of flexibility and openness was a decisive factor in selecting straton.

Another fact that was well received by Lafarge Perlmooser was straton's ability to make online changes, which allows program changes to be imported during operation. Interrupting the operation of process automation systems like the ones at Lafarge Perlmooser would involve problems and costs. With straton

and zenon changes can be made without stopping the system. straton's binding feature offers a very convenient way of dividing the overall process into several decentralized areas that stay in contact without any extra cable connections. In this way, parts of the conveying system that are far from each other were integrated into the overall system in a very elegant way. zenon and straton interface with nearly any hardware. Therefore, Lafarge Perlmooser can deploy and change PLCs as required. This allows for the flexible extension of the system and the connection of different projects.

Marting Grüber, CEO of MGX Automation: "We found the astonishing depth of the integration of straton with the zenon control system to be really helpful. They both use a common database and therefore variables are always available in both systems automatically. Additionally, we can use sophisticated communications such as Profibus, Modbus and IEC 60870 for connecting new and existing system components."

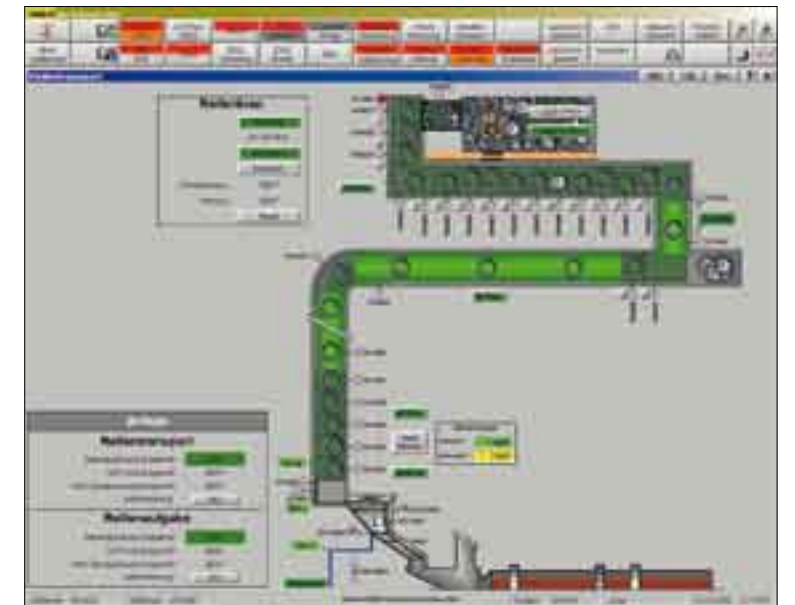
ONE STOP SOLUTION

Martin Grüber: "The big challenge for us, besides the short time available for the change, was to consider the optimi-

zation requirements of the operators. In March 2008, the system was launched in its new design. We were able to meet the requirements of the operators: They can now solve 90% of all problems directly in the control station without the need to travel long distances."

straton and zenon were also used in the LABCONTROL project. This system automates and visualizes the high level processes of a fully automated laboratory for production analysis and quality management in the cement production. LABCONTROL is the communication hub between the conveying systems and analytical devices of the laboratory on the one side and the existing control system and process data acquisition system on the other. Here straton runs as a soft-PLC, together with zenon, on a PC and uses the flexible communication features of the multi-driver concept for connecting to other systems.

Rober Meixner is responsible for technology and automation in the plant in Retznei: "With its convenient user-interface and its integration with zenon, straton makes work easier for our maintenance employees and allows us to perform program changes and small automation projects on our own."



Prefabricated automation structures at Italcementi.

For most companies automation takes time; sometimes taking several weeks to get from a project plan to a completed system. Italcementi now creates its projects within an hour and the complete design and engineering phase takes no more than three days. This enormous acceleration was achieved by using a Wizard created by JS Automation using COPA-DATA's zenon, which is now in use in Italcementi's French plants.



ITALCEMENTI: MORE EFFICIENCY THANKS TO AUTOMATION

Italcementi is one of the biggest international producers of aggregates, ready-mixed concrete and cement. To increase the efficiency and productivity of their plants the French subsidiary of this Italian company was looking for a solution that would bring with it several advantages. Paulo Pereira, Technical Manager Automation for Granulates and Concrete, France and Belgium, explains: "We wanted a reliable system for simplifying the creation of our projects in over 80 plants with differing automation

requirements. We also wanted to become independent of external services and also to lower our costs. Additionally, we wanted to make our projects easier to maintain than before. The perfect interaction of all components is very important for us. Our main criterion was a maximum degree of automation during project creation."

After considering the various solutions available on the market, Italcementi

opted for JS Automation. The managers of Italcementi asked, "Can you automate our engineering?" and JS Automation answered with a clear "Yes". The French distributor of COPA-DATA's innovative solutions used the joint power delivered by zenon and its fully integrated soft-PLC, straton. In January 2008, JS Automation started implementing the Application Generator that would permit a completely automated engineering process. For this, they used the freely programmable interface of straton and zenon. By fall, the first four plants had been equipped with the Generator. Then, all plants will be using zenon, straton and the Wizard.

Hervé Seyfried, technical project manager at JS Automation, "straton and zenon were the obvious choice. This 'team of two' was the only solution on the market that easily fulfilled all requirements. The tight integration of straton and zenon made our task much easier. Additionally, straton can communicate readily with many different networks. This allows direct addressing of the machines via I/O."

AUTOMATIC ENGINEERING: THE APPLICATION GENERATOR

Automatic engineering creates new space and liberty. Engineering times and costs

are lowered significantly, as are on-going support costs. Automatic engineering at Italcementi now means: Answering some questions about the design and then watching the Wizard create the production tool – the Application Generator performs about 90% of the required tasks automatically. This means that less expert knowledge is required in the company, which in turn means less training costs, less consulting costs and reduced dependence on external resources.

How does this Wizard by JS Automation work? After starting the Application Generator, the user defines the project using an interactive dialog. The Wizard then creates the complete automation project for straton and zenon. straton, an IEC 61131-3 programming environment, is integrated seamlessly into the zenon HMI/SCADA system, via one single database. Functional blocks have been developed in IEC 1131-3 standard languages for all types of machines encountered on production sites. The Application Generator maintains a connection between the block's inputs and outputs. The process staff then only need to configure elements such as the machine's startup and shutdown sequences, timing, alignment etc. It connects directly to I/O systems of different manufacturers such as Wago via

a network interface. If required, straton can also communicate with any PLC. But the really important thing is the tight integration of zenon and straton.

COLLABORATIVE WORK FOR DIRECT CONTROL

zenon handles the visualization for Italcementi projects, collects data and analyzes it. This data is used, for example, by the zenon "Industrial Maintenance Manager" module (IMM) to optimize maintenance activities and to make sure there is only minimum interference with everyday operations. It allows for the exact and targeted scheduling of maintenance activities. At a glance, the user sees which devices, systems and machines require maintenance and when. Additionally, it logs all the maintenance work performed in the past. As the data is in a SQL database, it can easily be used by other applications. In addition to seamless integration with straton, zenon features a truly open design, including over 300 communication protocols, and also with connectivity to superordinated systems. Italcementi is profiting from this teamwork, which was also one of their requirements. Many sources of error are ruled out in advance; time-consuming and expensive detours are avoided.

APPLICATION GENERATOR FOR ITALCEMENTI:

- ▶ Application Generator automatically creates projects for straton and zenon
- ▶ direct connection via I/O
- ▶ straton masters all current protocols
- ▶ zenon Reports
- ▶ zenon Industrial Maintenance Manager
- ▶ faster automation
- ▶ less time required
- ▶ simple maintenance
- ▶ independence



Practice has shown that project maintenance effort has also decreased. zenon itself is really easy to use and makes work simple even for inexperienced users. Changes can be implemented at any time, even during operation - an advantage also provided by straton.

STRATON: POWER AT ALL LEVELS

At Italcementi, straton plays the role of an intelligent field bus controller, communicating directly with physical inputs and outputs on the I/O level. However, the main reason for choosing straton was its capability to act at other levels as well.

On the process control level, it acts as a powerful, real-time control unit in the form of a soft-PLC that receives data via all commonly found field buses. This allows for the simple use and integration of existing PLCs of many different manufacturers. By integrating straton into the independent SCADA system, zenon, it can also work as the computing centre. The powerful interface between zenon and

straton guarantees optimum real-time behavior and allows processing of large amounts of data in a short time. Both systems can be easily configured for redundant operation to increase security. straton makes it easy to run the HMI and the PLC on a single system, ensuring a good overview and saving costs. The straton workbench - an IEC 61131-3 programming environment - is integrated seamlessly into zenon, delivering considerable advantages for engineering tasks: redundant variable pools or variable list imports are no longer necessary. With a few mouse clicks in the straton Workbench, the user can configure the data to be shown in zenon. The straton Workbench supports all five programming languages defined in the IEC 61131-3 standard and allows for the smooth conversion of one language into any other IEC language.

ZENON: PERFECT TEAMWORK

straton and the zenon HMI/SCADA software work as a team in the plants of the

Italcementi Group. zenon is provided by COPA-DATA, an innovative European company specializing in HMI/SCADA systems, and delivers striking advantages with its truly open design. Just like straton, it supports any kind of hardware and all current Windows operating systems. But above all, it can create secure networks with only a few mouse clicks. Within minutes, it creates a redundant system where every computer can be the server or the standby server. If one of them crashes, the standby server will seamlessly take over its tasks, without data loss. Additionally, zenon - just like straton - features a hot reload capability: engineering changes can be implemented during operation without having to stop the system.

zenon also ensures a good overview. With only a few adjustments, several projects can be combined in an integration project. The integration project takes over the role of an index, listing all projects and providing fast access - even across plants or countries. Italcementi can

“The decision to use zenon was a very logical and obvious one. It ensures optimum connectivity to existing systems in our plants, it gives us exactly the automation that we need and it convinced us with its excellent integration with straton.”

PAULO PEREIRA, TECHNICAL MANAGER AUTOMATION FOR AGGREGATES AND READY-MIXED CONCRETE, FRANCE AND BELGIUM

now combine any number of projects and also monitor and control them remotely. The foundation for this already exists; the actual engineering procedure required for this feature is a standard task. A finely structured user rights system allows definition for every user and which projects they can view and which settings they are allowed to change.

MORE PRODUCTIVITY, LOWER COSTS

By specifying zenon with straton, JS Automation made it easy for the Italcementi Group to select them... zenon and straton was the only system that was able to meet all the automation requirements: a generator that would adjust to the individual requirements of the users. The Application Generator lowers the effort required for engineering and maintenance. As do zenon and straton, enabling the targeted use of resources in many ways. For example, with zenon's network functionality, it only takes a few mouse clicks to create a completely functional network. It enables secure redundant operation and creates a clear overview - across different plants. If at any time, Italcementi wanted to combine several plants or maybe all of them and monitor, control and visualize stations remotely, that would be an easy task for JS Automation, zenon and straton.



zenon delivers manufacturing performance.

Mabey & Johnson builds modular bridges; the complex metal fabrications require both precise control and monitoring so that factory efficiency stays high. To achieve this Mabey & Johnson managers have to have accurate and timely manufacturing information. Integrating the various cutting,

welding and drilling machines to the company's management system coincided with the development of an easier manufacturing cell interface and data acquisition for OEE; both tasks were combined into one project using COPA-DATA's flexible zenon SCADA solution.



Mabey & Johnson designs and manufactures a range of steel modular bridging - and have been doing so successfully for almost 35 years. At the Mabey & Johnson facility in Lydney, Gloucestershire (United Kingdom), they manufacture on average 30,000 tonnes of bridging per annum and export to a wide range of countries. There are 250 employees locally and many more located across the world. Customer requirements range from a single bridge to a fully supported project for supply and installation. New bridges provide an es-

sential link to the development of agriculture, health and education in overseas rural communities. Through a number of supported programmes, Mabey & Johnson works alongside the customer to build bridges quickly and efficiently at low overall installed cost.

Mabey & Johnson bridges are constructed from standardised and interchangeable components that are easily transported and erected - the basic concept being field proven in the 1940's. Raw material steel stock arrives at the plant

and is converted by cutting to length and at various angles to become components of their bridge modules. The modules themselves are assembled by welding on large automatic machinery, fixing holes are drilled, the final product is galvanised and is then ready for shipment. The bridges are assembled at the delivery site from sets of modules using large diameter pins. The metal decking of the bridge is also supplied and can be supplied with various optional road-deck coatings such as gritted tarmac for improved vehicle traction.

The current automation project finds its roots in a new Robotic Welding Cell upgrade in Sweden - where to have remote access for maintenance and diagnostic from the UK was required. The robotics vendor (ABB) recommended Beckhoff as the control solution and further consultation with Beckhoff in the UK resulted in the specification of suitable hardware. The visualisation was undertaken as a bespoke solution and although this was functionally satisfactory it presented a significant learning curve for the UK engineers if they were to adopt this as a standard. The first UK-located project was for the automa-



tion of the reclaiming of grit from a road-deck "grit shaker" coating machine. Here the solution was again Beckhoff hardware but with embedded zenon (running on Windows CE). The engineers at Lydney quickly realised that in zenon they had a very flexible tool for many other tasks that were in their improvement plan. It was here that Steve Grice, Electrical Project Engineer found that, "you can get zenon to do whatever you want it to do, with virtually no barriers."

SIMPLE FOR OEE MEASUREMENT

As with many manufacturing industries most machines are standalone and the workflow is governed by material flow. Mabey & Johnson knew that much information was locked up in each machine and in particular OEE (Overall Equipment Efficiency) was the key to their competitive position and to sustaining customer satisfaction. The workflow is organised according to the production plan, a machine's overall capacity and then adapted when maintenance is required. OEE reveals machine utilisation and allows

production and capacity planning to be optimised.

Initially this requirement resulted in two projects; one by the control engineers to improve the cell user interface and obtain data for OEE and the other by IT to obtain KPI and manufacturing information through keyboard manual data entry (material usage, historical data). The experience of using zenon on the Grit Reclamation project created the realisation that with zenon both projects could not only be rolled into one but also made better by automatic data acquisition and menu driven machine stoppage and fault reporting. zenon was easily configured for this task and was able to communicate with the company's OEE package using OPC, the data being collected from all other networked zenon controlled manufacturing cells by a host zenon running on the OEE database server.

HIGH LEVEL OF CONNECTIVITY

The communication layout in the factory is by a fibre optic backbone that has both wired and wireless connection to various



machines. The machines are very large and have PLC controllers as well as specialist robot controllers for welding, with 9 motion axes being typical. The welding motion programmes are developed both by using the 3D CAD drawings and by teach-mode, the correct program being selected by the operator via the plc. Touch screen interfaces have been added to each cell these are the operator's interface to the zenon supervisory system using Windows XP. Access to each machine's PLC is facilitated by zenon's high level of connectivity through its extensive library of drivers, in some cases the PLC programmes are sensitive and non-invasive data acquisition is accomplished by slave I/O devices that can be accessed directly by zenon's integrated logic controller, straton.

FLEXIBLE AND INTUITIVE

It is worth noting that the zenon editor is the same for PC or CE runtime operating systems, therefore training and experience was reusable across these technologies. Each zenon controlled cell can

be accessed remotely to provide flexible supervision and monitoring by control engineers and for maintenance diagnosis. Mabey & Johnson has thousands of part numbers and many bridge variants within its range of bridge products. Although they provide bridges on a non-emergency basis for planned development they also provide complete bridge kits at short notice usually following an environmental disaster. They pride themselves in being able to ship reliably at very short notice. All of this takes a great deal of background planning, and requires knowledge of what is being produced, OEE and schedule adherence. The use of zenon as the supervisory cell controller has allowed access to all this information, delivered intuitive cell control and provided drop-down menu reporting of faults and stoppages.

Steve Grice, Electrical Project Engineer, "zenon has allowed us to develop a single solution that meets both our cell control and IT reporting requirements, it is flexible to use and in many ways is intuitive to develop." Andy Phillips, Busi-

ness System Analyst, "zenon was a whole new world for me as an IT specialist, however, the training showed me what could be achieved and the result is highly automated and error proof management data acquisition."

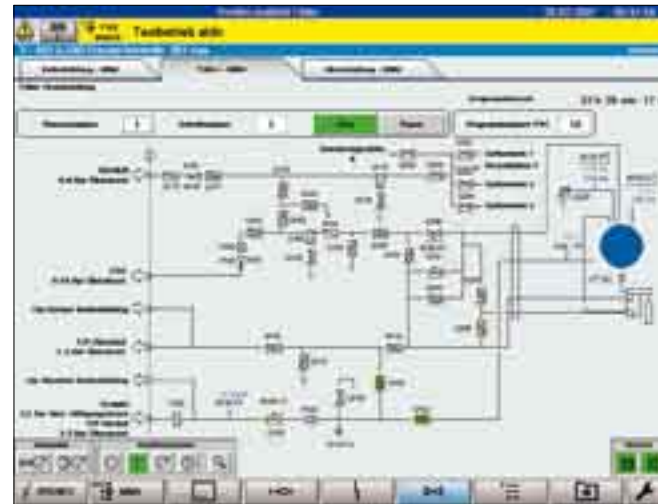
All development work has been undertaken with in-house resource following some self-training and later formal training by COPA-DATA UK and support and guidance by COPA-DATA's comprehensive support services. OEE is being driven towards 85%. Traceability is important to Mabey & Johnson quality control and each manufactured part can be traced back to its original raw material batch, this is being expanded to automate the "quality pack" that is sent out with each bridge set. The future planned extension of the system will be to progressively add all the other manufacturing cells to the system (5 out of 14 currently being integrated), to also obtain energy data for energy saving, and to intelligently integrate the factory lighting system. As Steve Grice puts it, "with zenon you are limited only by your imagination".



Getting equipped today, ready for tomorrow's demands.

The demands placed by the market on the beverage industry are increasing all the time: companies are now facing up to the challenge of optimising their filling and packaging processes and becoming ever more competitive. This can only be achieved by using state-of-the-art information technology.

Unlike other production plants, filling and packaging plants are now generally not controlled from one central point. Many control panels on individual machines and conveyor systems look after the material flow throughout the plant. The drawback to this approach is that individual machines cannot always be reached directly in the event that operator intervention is required or problems arise. It is also not always possible to man every station with an operator, since this results in excessive time and expense. In order to remain competitive and to manage the plant more efficiently, an operator must have an overview of every operator station, must have the ability to intervene rapidly in the production process where necessary, and must have the ability to detect problems and respond immediately. Krones AG, a company specialising in installing and configuring complete filling and packaging lines, understands that information flow has today become every bit as important as material flow. This



company, based in Neutraubling in Bavaria, is in the vanguard when it comes to installing state-of-the-art network technology and software. Krones has already set up countless filling and packaging lines for glass bottles, PET containers and cans on behalf of breweries, soft drink manufacturers and companies involved with the wine and spirits industries.

NETWORK TECHNOLOGY UNDERPINS FURTHER DEVELOPMENT

Manufacturer-specific bus systems have so far been the most commonly used means of connecting individual machines with a system for the purpose of sending and receiving information. Industrial Ethernet has now emerged as the best medium for transferring large volumes of data between IPC devices. Krones uses fibre-optic cables here, thus avoiding electromagnetic interference from the word go. Krones installations are also unaffected by any limitation on the length of fibre-optic cables, since cables within the plant will never exceed the maximum permitted length of 2 km. When a network is implemented with copper cable, on the other hand, the picture is quite different: data transfer can become unreliable as soon as cable lengths exceed 100 metres. The network structure favoured by Krones for its filling and packaging lines has a star configuration with a central network server.

This guarantees the user maximum freedom from interference since the connections in the network are exclusive. Furthermore, every single machine can avail itself of a 100 Mbit/s bandwidth, and all applications – including the line diagnostics system, the line management system, the process control system and the mobile service information system – can run concurrently and without any form of mutual interference.

VISUALISATION AND EFFICIENT MANAGEMENT OF PLANTS

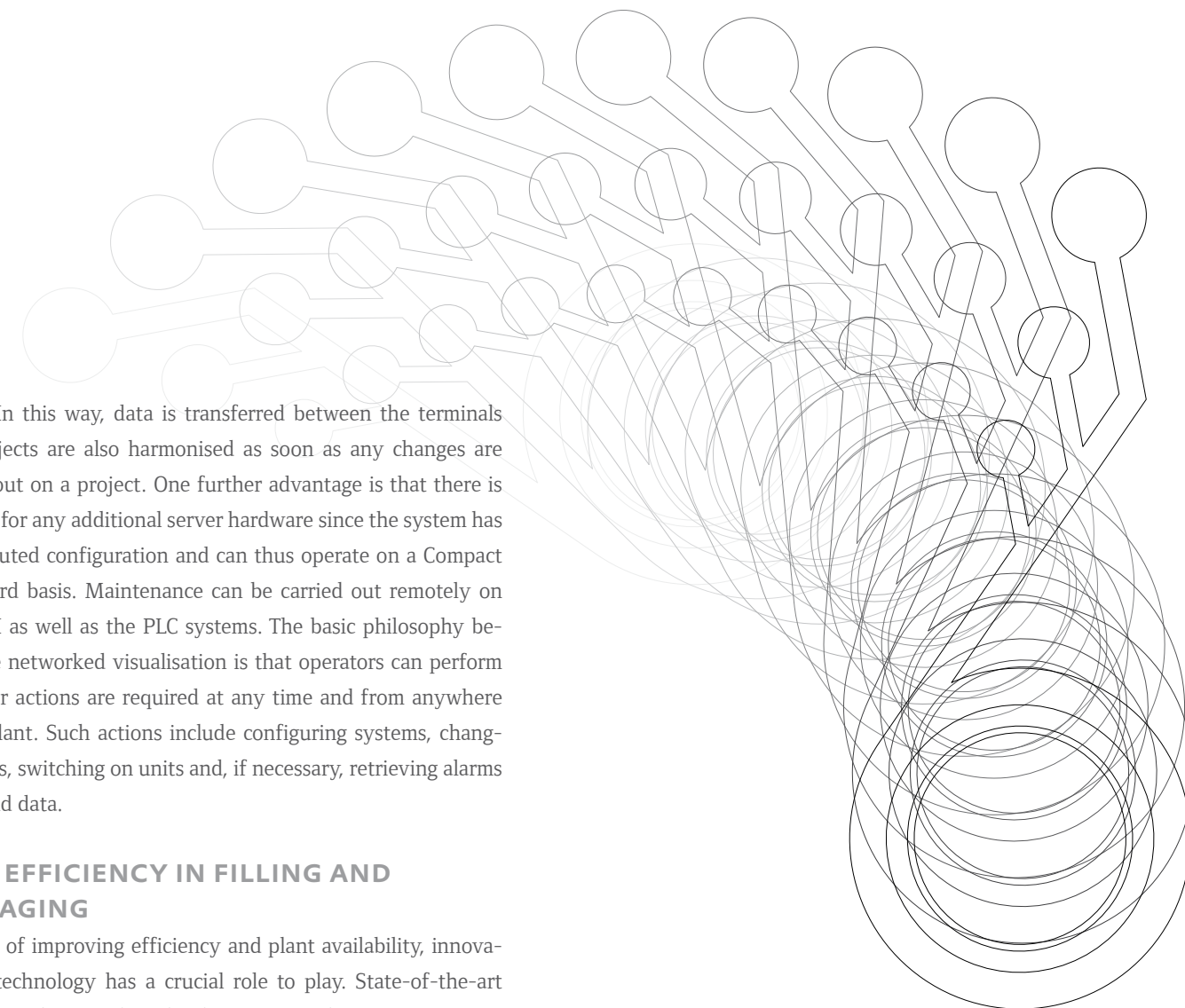
Krones believes in state-of-the-art technology for its human-machine interface too, and has therefore chosen zenon from COPA-DATA GmbH for its machines. zenon is a software application whose strengths include scalability, flexibility and openness. zenon features a drag & drop interface for networking individual machines to form an integrated system; a separate machine (known as a “stand-alone project”) is activated with a click of the mouse and converted into a network project when the user drags it to the desired position in the zenon network manager’s project tree. If the user enters the corresponding computer name or selects a computer, then the desired operator terminals will become available immediately. An intelligent token ensures that all operator actions are managed in an orderly fashion. If an authorised user submits a request, then the token is passed to that user in order to avoid actions being duplicated and errors occurring. The project manager can define in advance which functions zenon is allowed to perform on the network, and which are not permitted. There is one more plus point with this software, which is that zenon does not require a central server. Any control panel that is assigned to a controller can act as a server for another client – an operator terminal, for in-



stance. In this way, data is transferred between the terminals and projects are also harmonised as soon as any changes are carried out on a project. One further advantage is that there is no need for any additional server hardware since the system has a distributed configuration and can thus operate on a Compact Flash-card basis. Maintenance can be carried out remotely on the HMI as well as the PLC systems. The basic philosophy behind the networked visualisation is that operators can perform whatever actions are required at any time and from anywhere in the plant. Such actions include configuring systems, changing types, switching on units and, if necessary, retrieving alarms and trend data.

COST EFFICIENCY IN FILLING AND PACKAGING

In terms of improving efficiency and plant availability, innovative IT technology has a crucial role to play. State-of-the-art software and network technology ensure that systems are as safe and user-friendly as they possibly can be, that filling and packaging processes take place as efficiently as possible, and that as a result the costs per unit produced can be reduced ever further.



Highest quality bottling for Pepsi-Cola using zenon.

Quadrant Amroq Beverages (QAB) is one of the largest American investors in Romania, a licensed bottling company and distributor for Pepsi-Cola®, Prigat, Lipton Ice Tea and Roua Muntilor in Romania and in the Republic of Moldova.



QAB entered the Romanian soft drink market in 1991, bottling and distributing the products of PepsiCo. In 1992, the company opened the first polyethylene terephthalate (PET) bottling line in the country, beginning with Pepsi 1.5l bottles and launching Prigat in 1993, the first still drink manufactured in Romania. The Company experienced a 48% increase in turnover in the year 2004-2005. This

huge success was the result of the company's decisive action and the QAB team investing over 14.5 million USD in the Romanian soft drink market in 2005 to launch new carbonated and still products and introducing a packing system that ensures the integrity of their products. Moreover, QAB was nominated among the best bottling companies in the world, in the PepsiCo system.

KRONES WITH ZENON HMI SOFTWARE

QAB's drive for high quality was also mirrored by the investments made at the production level, which utilise the latest trends and technologies. One example is the state of the art bottling line installation at QAB, manufactured by a world leader, Krones. The productivity, reliability and optimal operation of the equipment are determining factors in the success of the Pepsi-Cola bottler.

All equipment was designed in such a way that both the operators and specialist teams have the tools required to operate and control the complex equipment effectively. The software interface had to be direct, immediate and satisfy their needs perfectly. COPA-DATA's zenon software suite was found to exceed these requirements and was chosen by Krones for their HMI (human machine interface). Furthermore, all new machines manufactured by Krones are now supplied with zenon 6.20 XP embedded powered HMI's.

SCADA IS SIMPLIFIED WITH THE LATEST TECHNOLOGY

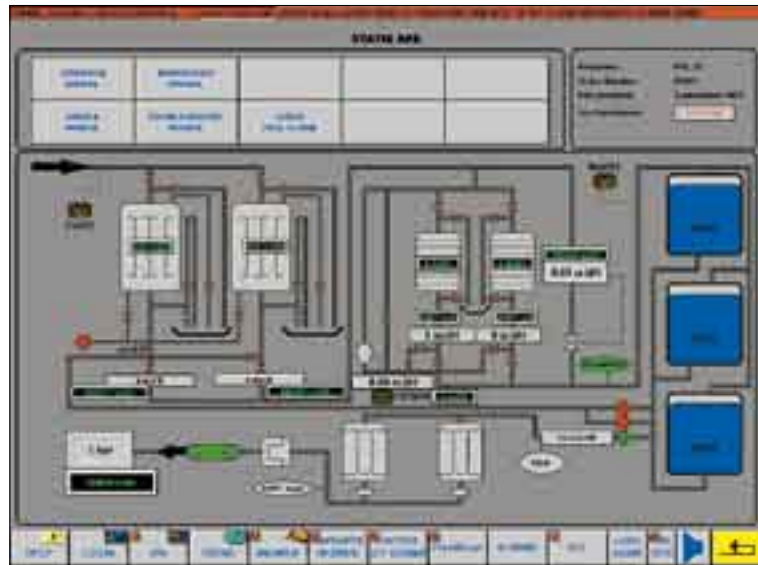
QAB uses the most modern equipment and their team wanted to push the limits of their machines. The specialists have the capability to analyze every machine in detail, and furthermore the power to monitor the overall characteristics of the plant which has to provide optimal quality and productivity. Mr. Mihai Ciorbaru, Technical Manager of QAB and his engineering team, decided to create their own SCADA application using zenon, as the professional tool for visualization and analyzing the plant data. At the beginning of 2006, during the design phase, QAB had decided that zenon was the best choice for the SCADA software. Together with Kreatron Automation, the Romanian zenon distributor, the complete software & hardware solution was identified.

Ciorbaru explained, "In complex systems, SCADA has to satisfy three main criteria: interface simply with most automatic control systems, facilitate in the

handling and visualization of the analysed data and to remain flexible for future modernization of the production process. We discovered all these advantages using the zenon software".

As in every SCADA application, effective communication with the hardware was essential. QAB used a highly reliable industrial PC, interfacing with equipment using zenon's built-in drivers. An advantage of zenon is that over 250 drivers, developed in-house ensure its integration into complex, heterogeneous projects where interfacing hardware components from diverse suppliers is the key to successful implementation. As Ciorbaru highlighted, the zenon software suite gives users the power to work at a high technological level, in a very accessible way. A practical approach, the programmer receives highly evolved software instruments, in order to develop their own project by freely parameterising components. In fact, developing the application is closer to engineering than





to classical programming, the focus being on the process and desired functionality rather than coding.

As a result, the SCADA tool designed “in house” by QAB could be further developed by the bottling specialists according to their technological or organizational needs. Using zenon, they are completely capable of maintaining and developing their own system.

HIGH QUALITY PERFORMANCE FROM ZENON

No matter whether Pepsi, Prigat or Lipton Ice Tea is produced, at QAB consistent quality control is essential. When the market demands flexibility, the change from one bottled product to another has to be achieved with minimum production downtime and maintaining maximum quality. “Any process has to be kept under control, and sometimes this involves a large number of parameters that have to be managed within a given space of time. With the zenon programming system, this task becomes simpler, due to the math-

ematical functions included in the software,” said Ciorbaru.

The modular structure of zenon allowed the QAB engineers to select the software mechanisms that could best implement the application requirements. The plant effectively “appeared” on their desktop PC with an overwhelmingly amount of data, they then transformed it into extremely useful information using built in tools so that they could control the quality and productivity of the bottling line as described below:

- ▶ The entire process is presented optimally on screen,
- ▶ but operators can also “zoom in” on equipment in
- ▶ detail, resulting in an effective and user friendly top-down application.
- ▶ The operator receives exact and complete information using alarm and event management. By filtering the information according to their requirements, the user’s concentration is focussed entirely on the analyzed

aspects of the process.

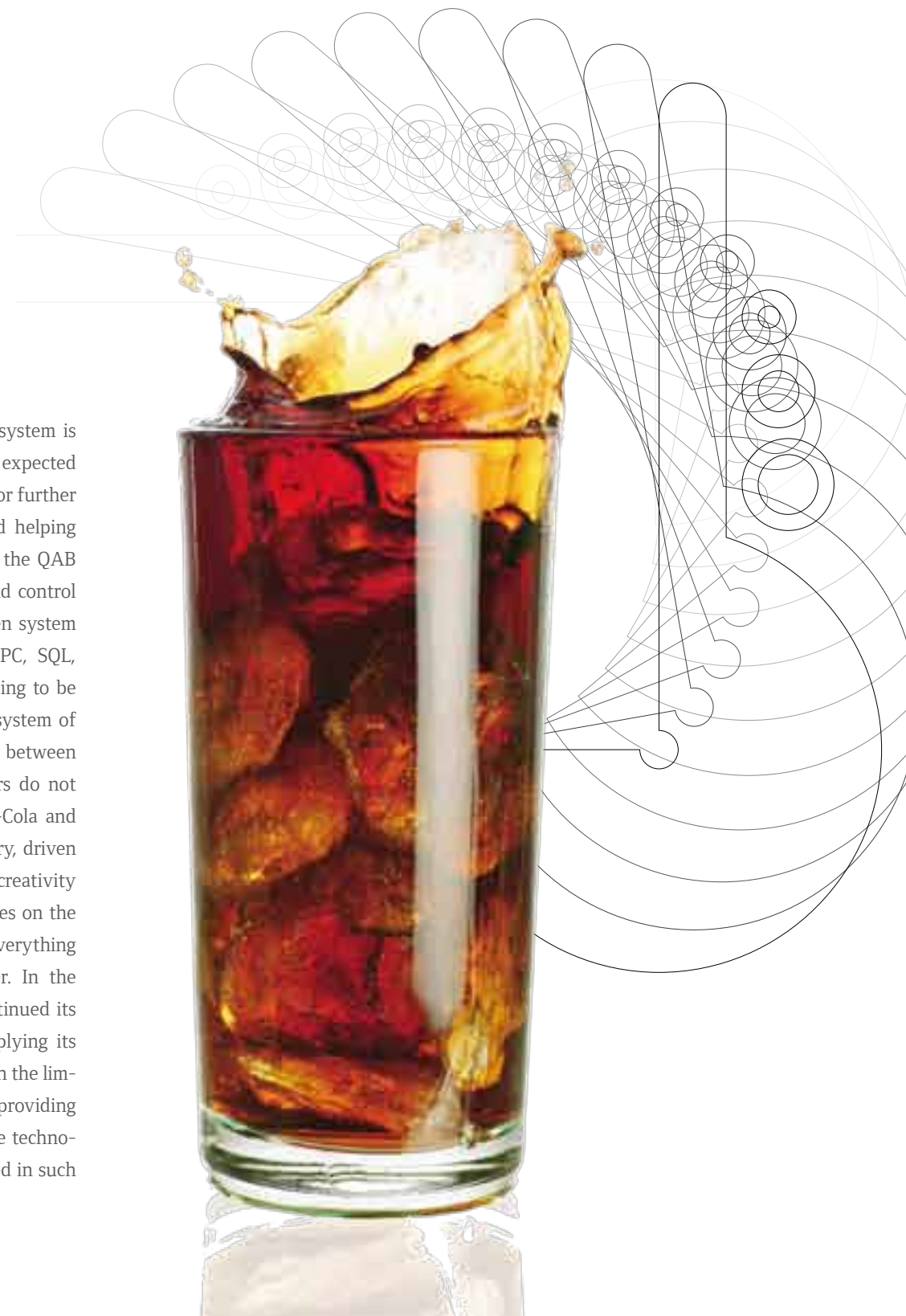
- ▶ Data archiving is accessible and flexible using the zenon archiving module. The data is archived not only as it is collected directly from the process, but also in the processed form using so-called “derived archives”.
- ▶ The pieces of information gathered become valuable because they are processed and presented in an advanced graphical system and analysed with the help of the built-in report generator.
- ▶ Accessible, flexible, well founded mathematical functions assist with the development and expansion of SCADA projects.
- ▶ Software mechanisms ensure that users from the operators to the maintenance team of the plant, quality assurance department, production, planning and surveillance team, receive the most relevant information to perform their individual roles effectively.

“Any process has to be kept under control. With the zenon engineering tool this task becomes simpler, due to the mathematical functions included in the software.”

MIHAI CIORBARU, TECHNICAL MANAGER OF QAB

GREAT FUTURE

Now, the zenon-based SCADA system is already offering better than the expected results, being a source of ideas for further technological developments and helping more and more departments of the QAB team solve their information and control needs. Because zenon is an open system based on standards such as OPC, SQL, SNMP, the SCADA system is going to be easily integrated into the ERP system of the plant. Such happy meetings between innovation and quality suppliers do not happen by mere chance. Pepsi-Cola and QAB is a continuing success story, driven by the promise of quality and creativity servicing the consumer that relies on the QAB team’s innovation and everything the latest technology can offer. In the same way, COPA-DATA has continued its tradition of innovation and applying its experience in automation to push the limits of HMI/SCADA technology, providing customers such as QAB with the technological edge they need to succeed in such a competitive market.



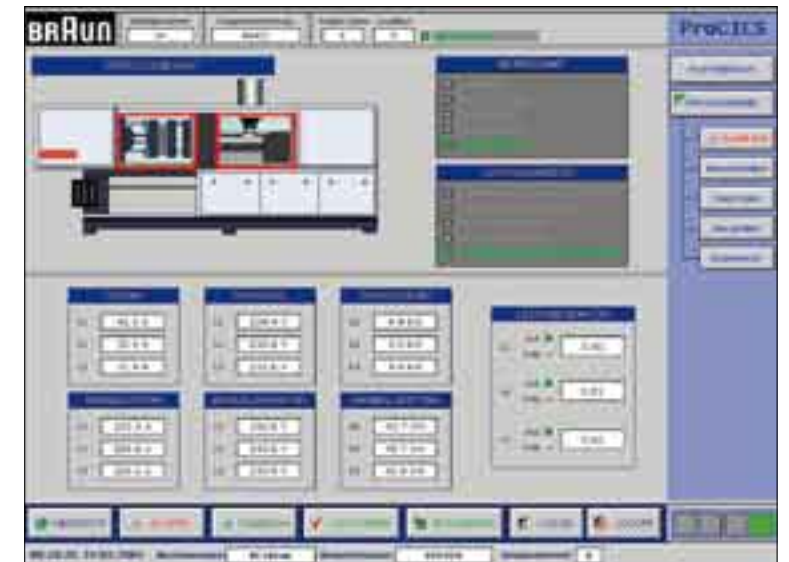


Smiles all round at Braun-Gillette.

Braun-Gillette's toothbrushes promise customers a "beaming smile" - and now Braun Project Manager, Gerhard Dittmaier, has every reason to enjoy a "beaming smile" too! Under Dittmaier's leadership Braun-Gillette developed a requirements profile that formed the basis for the construction of an information and control system for the company's in-house plastic part production. The realized application is based on COPA-DATA's process control system zenon and its embedded control solution straton and now gives Braun-Gillette universal transparency of production data for its plastic parts operations.

Dittmaier, Project Manager & Computer Engineer, spearheaded the company's "ProCICS" project to deploy a Production Cell Information and Control System which would improve productivity and simultaneously reduce costs at Braun-Gillette's factory in Marktheidenfeld, Germany. Under Dittmaier's leadership, the project team analyzed the necessary functionality required by any potential new information system. To achieve this, they reviewed the experiences of every co-worker involved in the daily function of the injection-moulding cell. The requirements the team identified included:

- ▶ Integration of the peripheral equipment on the injection-moulding machine such as part removal robots, feed units, temperature-control units. Previously, this had been excluded from the control system but it was thought that as a result of full integration, immense advantages through efficient signalling of incidental error and failure messages could be expected.
- ▶ An appropriate data-transfer to the central sites was necessary to realize this goal.
- ▶ Furthermore, software should be "easy to use"



By deploying COPA-DATA's visualization system, zenon, the meaningful display of site data was possible. This effective overview of plant operations could facilitate quick responses and manual intervention where appropriate, so production defects would be dramatically minimized.

A SINGLE POINT OF ADMINISTRATION

Initially, the project team had not considered it necessary to integrate business or production data in to ProCICS. However, following their research it became clear that integration was desirable. Any control system would, therefore, have to support:

- ▶ modular upgrades, or the ability to add extra functionality as required
- ▶ independence from manufacturers, to allow for future expansion
- ▶ machine independence
- ▶ production control from various workstations or other locations, and
- ▶ the integration in to a central management system.

Dittmaier explains: "With ProCICS we wanted to establish a single point of administration' in our factory." Faced with these requirements, those involved with the project realised that open and flexible integration was going to be a key factor for them. Every injection moulding cell comprised of several independent devices with various interfaces and controls:

- ▶ modbus-interfaces for the feed units
- ▶ profibus -interfaces for the temperature control units
- ▶ serial-interfaces with manufacturer-specific protocols for the removal robots and injection moulding machines
- ▶ I/O interfaces on older devices.

This variety of interfaces had made it previously impossible to create direct communication between the individual devices.

Important technical data was not visible thanks to the proprietary communication protocols and heterogeneous environment. Without integrated communication, if a process component failed, no remedial action was taken, for example to redirect or restart the process, so production defects or a plant stand-still could easily occur.

To deliver the project, Braun worked with local system integrator Prozesstechnik Kropf. For on-site operation, an embedded PLC with touch screen from Lauer was chosen. As a special feature, the hardware was equipped with two network interfaces. This enables the entire production cell to be sealed off from the outside networks so unauthorised access to internal data could be easily prevented. Through the second network interface the cell obtains a unique IP-address in the corporate internal network. This allows it to be able to, for example, retrieve data from the central control room. Braun decided to use the software recommended by Prozesstechnik Kropf; the zenon SCADA and straton embedded control application from Austrian software specialists COPA-DATA. One powerful reason for selecting the zenon/straton product suite was because the straton embedded control system made it possible to achieve the control of such a wide variety of interfaces and peripheral components. straton, the zenon-embedded IEC soft-PLC, can utilise over 100 communication drivers. Modbus, Profibus and serial protocols are available as driver interface and therefore only have to be configured. Only the part-drawing robot from Reis presented communication problems as there was no standard driver for it. However, Prozesstechnik Kropf and COPA-DATA



worked in collaboration to deliver a new driver in a very short timescale. It is now possible to automatically and continually monitor the process parameters of all the components that are involved in the production process, and generate error messages when a component fails.

PARALLEL OPERATION OF OLD AND NEW SYSTEMS

A multiplexer was developed especially for this application, which reads the data from the injection moulding process. Via a serial interface it simultaneously shares information and machine data with the new ProCICS system and the original Production Data Collection system that was in place. The newly developed ProCICS system integrates transparently with the PDC system. By using the integrated zenon/straton solution, data from the various peripheral machines can not only be extracted but logically combined with each other. But by maintaining the PDC front end, for the users on the production team, the familiar development environment is still available, which is a major advantage. Engineering times can be shortened and errors minimised.

By combining the various process parameters within a single control application, it is now possible to proactively manage the process. Before, production failures could occur, for instance, when changes to the process temperature values had gone unnoticed. With the new system, an error message is generated immediately through zenon's alarm management functions and is transmitted to the control personnel via SMS. If the error is not removed within a specific time period, the production process is automatically stopped. Production errors and scrap have therefore been dramatically reduced. This represents a huge

raw material cost saving potential over the one billion parts the facility produces in a year. Another advantage realised by the integrated control solution is the management of process variables. An applied variable in zenon is immediately available in the straton control program and vice versa.

SYSTEM EXPANSION ALREADY SCHEDULED

"Having successfully deployed the system on the first injection moulding cell, the pilot phase of the project was successfully completed. The deployment of two additional systems are already underway. These two additional systems will be deployed on cells with an even more complex environment" says Dittmaier. He continues: "It makes sense to equip at least two thirds of the existing production cells with this system and consolidate the technical data at one point, to provide a single overview of operations." The project team's ambition of delivering a single point of administration could now be realised.

Braun are already considering how they can deploy some of zenon's other features in the future. Modules being considered include:

- ▶ zenon's Report Generator
- ▶ complete data recording using the Chronological Event List (CEL)
- ▶ Industrial Performance Analyzer
- ▶ the ERP PPS system which enables the writing of all data in a database over a single SQL/ ODBC driver – since this is a read and write driver, data can be accessed by a variety of applications at any time. In addition, zenon's networking capabilities make it possible to easily integrate the project at a primary control station or control centre, without the need for additional configuration.

The right fit for Clarks shoes.

When Cyrus Clark established a small sheepskin shop in 1825, nobody could have imagined that this would be the foundation stone for one of the most successful companies in the United Kingdom. Today, Clarks produces 41 million pairs of shoes per year, has 13,000 employees, a turnover of 1.4 billion Euros and is one of the largest companies in this business sector.



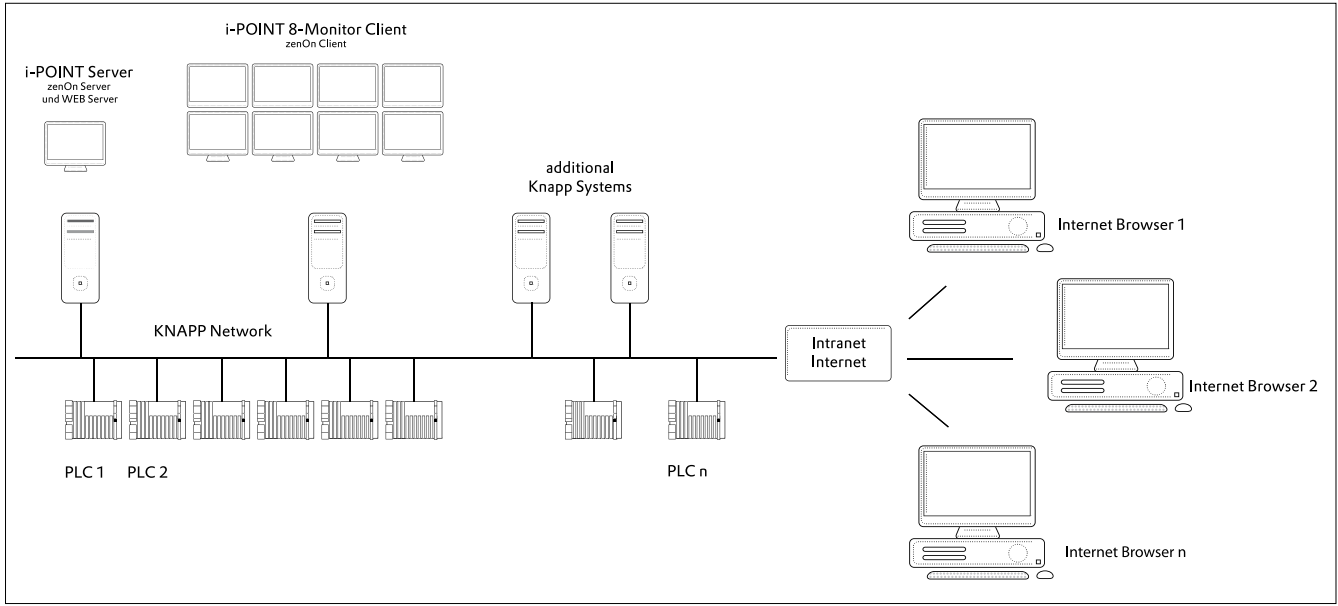
A new Clarks' distribution center has been built in Somerset, UK, because of increased order and distribution volume. The building has gigantic dimensions: 188 m long, 152 m wide, it covers the area of six soccer fields, and rises up to 18.5m high. It has enough room for the entire population of south-west England! The building has the capacity to store up to 6 million pairs of shoes and is designed for a daily throughput of 200,000 pairs.

In order to run such a center successfully you need a strong partner, for which Clarks turned to the logistics company, Knapp, based in Graz, Austria. Knapp has

more than 50 years of experience in the field of logistics. The know-how from more than 700 projects in different business sectors makes Knapp one of the leading companies in the global market. In addition to a great deal of mechanical automation and Electronics, the visualization is a core component of each system. For this, Knapp supplies its i-Point storage information software. Knapp i-Point delivers a consistent user interface for all tasks in a storage facility. In addition to the visualization of data and storage status, i-Point also delivers monitoring, control functions and the ability to configure components in the warehouse that are linked to these tasks. This means that the entire storage facility can be operated and monitored from one central station.

INFORMED BY ZENON

Knapp's i-Point storage information system is based on the



In a storage many different control levels and interfaces have to be reconciled. One of the many reasons for deciding on zenon.

zenon HMI/SCADA system, from the Salzburg software company COPA-DATA. Knapp had selected zenon as their control and visualisation software of choice as early as 2001.

When planning Clarks’ storage facility, it was clear, that the i-Point system would play a central and important role. Clarks demanded control center software, which could be used as a central solution for the entire facility. Based on these requirements, Knapp identified several elements of core functionality, which the i-Point system must deliver:

- Visualization and status display of the entire storage facility
- Integration of all systems,
- High availability and reliability,
- High quality visualization and functionality to ensure customer satisfaction.

In addition, in order to have a clear overview of a facility of this size, the ability to utilise multiple monitors is necessary. In the Clarks’ application, the decision was made to use an eight monitor system in a central control room. Fortunately, this was easy to deliver because multi-monitor administration is a basic function of zenon. At the same time, the Client wanted it to be possible to access the project from any workstation via their intranet or the internet and to display the data on one single screen. To do this, it was necessary to develop a completely new display concept for user guidance. On the one hand, each function should be available in each picture; on the other hand, a menu bar with buttons

needs a lot of screen space. After full consideration, and with the support of COPA-DATA, Knapp found an elegant and standard solution. At the top left of each display is a single button which displays a drop down menu detailing all functions that can be executed. An entire floor of the Clarks storage facility can be displayed over all eight monitors at once.

The i-Point at Clarks’ is the central monitoring station, where all information is gathered. It is here that problems in the warehouse are detected, usually before the employees in the warehouse would notice them. i-Point is not only used to monitor the warehouse, but also to manage work allocation. i-Point displays the status of all of the 600 ramps of the sorter. If manual intervention is needed, warehouse workers can be instructed by radio from the control room.

The result is a solution with which Clarks is completely satisfied: “Even during commissioning, the i-Point system has been an important tool,” Dr. Rupert Temel, Dipl. Ing., Head of Quality Management at Knapp. “The Knapp technicians working at Clarks could check the status of the system with the help of the i-Point system. This was useful at the start of the project, for example, defective and incorrectly connected motors were easily identified and repaired. With the i-Point system we simply printed out the alarm list and handed it to the electrician, who could quickly fix the problem. For a facility of this size with around 1,000 motors, this would have taken considerably longer without the i-Point system. With the i-Point system we have increased the efficiency of the facility considerably.”



EASY TO NETWORK, FLEXIBLE, OPEN

Dr. Temel continues: “The demands and functions of visualization in our industry sector can differ from one customer to another. Even if the storage facilities have the same structure, each customer has their own requirements. This is partly due to the great variety of the types of products that could be stored – shoes, pharmaceutical products, tobacco, CDs, etc; the size of the storage facility; the machines that are used; and the customer’s method of operation. In a warehouse, many different control levels and interfaces have to be reconciled; these include machines, PLCs and warehouse management systems, etc... This was one of the many reasons, why we decided in favor of zenon. zenon is an open system and offers more than 300 different connectors or drivers, so it can connect to nearly every system as standard.” Stefan Reuther, Ing., of COPA-DATA agrees: “A very good HMI/SCADA system should run on any hardware and communicate with any system. In this way, you can stay flexible and secure your investments. Above all, you can react quickly. zenon has been created for exactly this purpose.”

That means zenon delivers:

- An open system which empowers the customer to decide which hardware he wants to work with
- more than 300 different driver connectors out of the box – so no loss of time when connecting to new machines and modules,
- spontaneous data transfer – the load of the communication

channel is considerably reduced and, at the same time, transfers time date stamping and the status value from the PLC – so accurate data recording becomes possible.

- parallel operation - diverse hardware environments are part of everyday life; it is very easy to connect to several PLCs of the same type directly and in parallel, because any number of drivers – even identical drivers – can be used simultaneously.
- Many direct PLC connections - there are drivers which communicate with a wide variety of standard interfaces, such as OPC, SQL, DDE, SNMP or Modbus.

STANDARDIZATION IS A REAL BENEFIT

For Dr. Temel at Knapp the way zenon allows for the creation of standard projects is a real bonus. He says: “An important benefit is the standardization of the modules and the automated creation of process pictures.” For project automation purposes, the zenon Editor has an extensive VBA interface which allows it to elegantly solve recurring tasks. All process pictures, functions, menu entries, alarm messages, etc. can be created automatically. The VBA development environment integrated in zenon helps when creating special scripts. In addition to the time savings, this solution has another big advantage: complete accuracy. An error free script always produces error free results. These scripts can then be re-used in any project at any time. Quality increases and the time and cost of development decrease considerably. This, in turn, increases competitive advantage and End User benefits.



Streamlined, sequenced production without stock.

In its conveyor and storage system from Modine, Hörmann Logistik has implemented a production concept that gives customers the ability to manufacture their products in a streamlined, sequenced manner. This has enabled Modine to reduce its stock of finished goods considerably. zenon from COPA-DATA is responsible for the visualisation and efficient operation of the conveyor processes.

Modine's innovations have set standards throughout the industry for efficiency, cost effectiveness and long service life in the field of heat transfer. The company has been in existence for over 90 years, and has registered more than 2,000 patents. It is now in the best possible position for overcoming challenges now and in the future in the area of heat transfer. To get the solutions to market reliably and quickly calls for just-in-time and just-in-sequence production and logistics processes. The internal logistics must function practically, reliably and economically.

RELIABLE SUPPLY OF PRODUCTS TO THE BMW GROUP

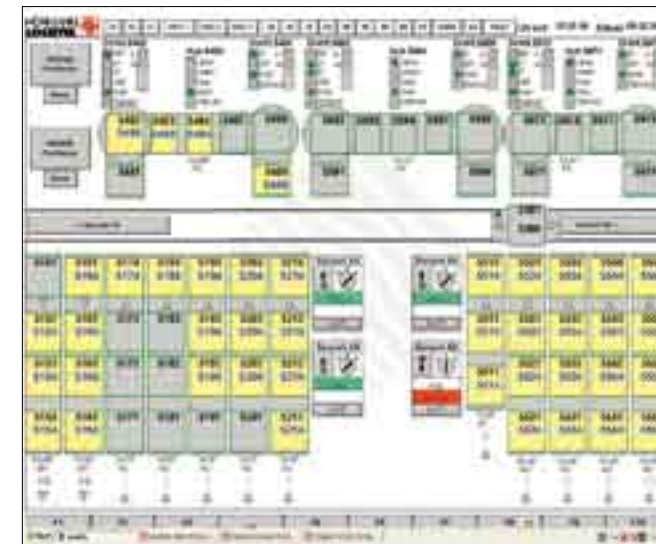
Modine Wackersdorf GmbH is an

assembly plant operated by the company that leads the way in the international cooling and heating systems market. Modine produces cooling systems for the automotive industry, most of which are used within the BMW Group. Modine products are well known for reliability. In order to keep up with the ever-growing volume of orders and the high demand for product diversity, the company got together with Hörmann Logistik to redesign the entire production and materials handling operations and build a new plant in which to set up these operations. Needless to say, the aim was to satisfy the requirements of their customers, and to supply them with products just-in-time and just-in-sequence. The aim was to ensure total

transparency in the production process as well as traceability of each individual product. Modine's aim is to achieve flexibility despite fluctuations in capacity, because 100 percent reliability in production and delivery must be ensured at all times.

MAXIMUM DEGREE OF AUTOMATION AND EFFICIENCY

The plant in Wackersdorf is now structured and implemented using a sophisticated intralogistics solution from Hörmann Logistik. HiLIS, the intralogistics system from Hörmann, manages all the storage and buffer areas, controls order picking, and with its "Factory Control"



module, takes control of the entire production process. HiLIS thereby ensures maximum transparency and plant availability in all functional areas. Using the 'target goods out date' and 'sequence chain' parameters, the whole plant is controlled in such a way that all the cooling systems are shipped just-in-time and just-in-sequence. The programmable logic controllers (PLCs) supply the information for controlling the storage/retrieval equipment and conveyor systems. The HiLIS Warehouse Management System module is responsible for managing storage, stocktaking and order handling. Materials flow control coordinates and optimises all the manual and automatic storage, conveying and transportation systems. The flow of goods can be adjusted and customised in each functional area according to the operational requirements. An international transport order can be broken down into partial orders for each specific plant. zenon forms a part of this solution.

INTRALOGISTICS WITH ZENON

COPA-DATA's zenon software is responsible for the plant visualisation at Modine, depicting all the functional areas of

the intralogistics plant in real time. The ergonomic, graphic display in zenon assists the user with simple working dialog boxes. zenon is set up as a multi-station system, and at each station it provides a comprehensive overview of the plant and the states occurring within the plant. The software supplies all the detailed data at each conveyor device (storage/retrieval device, cross-carrier, suspended electric train) and at each storage location, be that in a grid system, pallet conveyor system, in workpiece carriers or a high-bay warehouse. Altogether there are seven operator stations (server, redundant server, web server pro with five licences). The operators and maintenance engineers can therefore, thanks to zenon, always see and understand which lattice box or pallet container contains which individual components for the coolers, or where they are located in the high-bay warehouse. zenon also clearly displays the conveying processes involved in moving cooler components to where they will be further processed. From the high-bay warehouse the cooler components are moved to the workers' stations using suspended electric overhead conveyor in order that they can be further processed on the workpiece carriers and then moved on to the

inspection stations and quality assurance. The inspected coolers then pass into a sequencing buffer, where they can be made available in the order requested by the car manufacturer. At all times, throughout the entire storage and assembly processes, the cooler data can be accessed. 13 programmable logic controllers (S7), linked together via TCP/IP, are deployed. Approx. 22,000 values are read and processed in zenon. Transponders pass the information on to the suspended electric trains, and barcodes ensure that the data exchanged at the load suspension devices is correct.

ZENON ENSURES THAT MONITORING IS CARRIED OUT COMPREHENSIVELY

At Modine, zenon also provides a comprehensive system monitoring module. Users and Maintenance Engineers can rapidly diagnose and rectify potential system faults because they can access all the information directly. zenon flags up any errors that arise, and records them in a central error-logging module. The statistics not only permit detailed fault analysis, but also enable trends to be analysed in the long term. All these systems can also be maintained from a remote location via a VPN (Virtual Private Network). Any information that is generated and recorded in the course of the logistics processes can also be exported if required. Thanks to the flexible interfaces – in this instance to the SAP software – HiLIS can be linked up with existing ERP systems. Mobile devices like PDAs and tablet PCs with touch screens can also always be reliably connected via the wireless LAN. A plant operator or the maintenance engineer will be provided with electric vehicles with integrated mobile computers. If, for instance, fault messages occur, then the relevant employee can respond quickly and directly. Thanks to zenon, faults can be displayed directly on the monitor and rectified using the touch screen.



Transporting heavy loads safely.

Converteam, a specialist in traction technology, deploys COPA-DATA's zenon software for visualization and control on large-scale cranes. Converteam's most important reason for choosing zenon: the flexibility of the software makes it easy to adapt a suitable solution for every traction technology project.

Today, large-scale cranes are used in ports, shipyards and industrial plants worldwide. Customer demands on the cranes are rising steadily: available resources must be used more efficiently, processes must be improved and accelerated. Karl-Heinz Schacht, responsible for automation solutions at Converteam GmbH in Berlin, explains, "The operators of industrial plants are increasing their investments in modern traction technology to establish a high level of performance and, consequently, to reduce handling times."

Specialists in industry automation can confirm this statement. For example: a container ship used to stay in port for several days, but today, it takes only a few hours to turn around hundreds of containers. This task is executed by highly automated cargo handling technology. Many movements are now automated. The crane operator no longer has to worry about swinging loads or about where to place a container – sensor technology on the crane and computer-based logistic systems allow him to concentrate on "driving" and supervising.

CREATING TAILOR-MADE TECHNOLOGICAL SOLUTIONS

Converteam is represented in 25 locations in eight countries through which it supports its worldwide customer base to efficiency-boosting solutions. Besides power electronics for the drives, the Company also delivers complete automation solutions and electronic equipment. Converteam can also handle the project management and the engineering of complex electronics for drive systems and automation for its customers. The company has a modern manufacturing plant with powerful production and system testing facilities at its disposal. Converteam GmbH employs about 800 people in Germany and over 4,500 people worldwide. Their total volume of sales reached 876 million euros in 2007.

SAFE CRANE MANAGEMENT

The "Materials Handling" division of Converteam GmbH delivers electronic

equipment for large-scale cranes. zenon has been used by the division for the visualization of control and drive technology and the electromechanical equipment of large-scale cranes since the year 2003. Before that, the company had used an in-house solution, which was powerful but did not satisfy modern hardware and software requirements. It also took a great engineering effort to adapt this in-house solution, which is why Karl-Heinz Schacht and his colleagues decided to perform a market analysis and evaluate available tools for visualization and automation. Karl-Heinz Schacht explains, "We have used zenon successfully in several parts of our company; for instance in mining. However, our department decided to make a new, more comprehensive evaluation, in order to test whether zenon would satisfy important criteria like flexibility, network capability and an open interface architecture. Our evaluation proved zenon did fulfill our requirements." There were several reasons for using zenon. Because COPA-DATA offers very flexible license

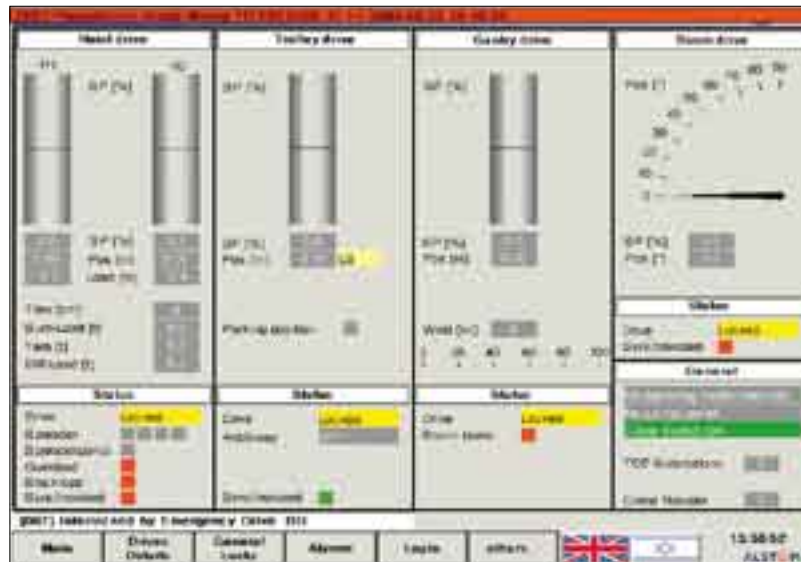
models, the customer is never "over-licensed" and the solution always stays attractive in relation to costs. In addition, the user training effort required is reasonable and employees are able to adapt the visualization themselves after a short time using the system. This saves time and costs, because there is no need to employ for specialist developers.

Another advantage of using zenon is that the software runs on Windows CE. This means that it can also be used on rugged panels that perform in adverse conditions. Because they don't use hard drives, zenon powered HMI (human-machine interfaces) can operate in difficult climatic environments and can withstand other influences like vibrations.

ZENON – OPTIMUM OPERATION AND TARGETED MONITORING

Today, Converteam is using zenon as an effective tool for operating and monitoring large-scale cranes. The software displays current states, delivers statistics whilst





archiving all the necessary data and makes daily operation more secure, thanks to its alarm functions. Several cranes are integrated vertically in a central station. Therefore, employees can access the current states of all cranes and the common alarm list from a central point.

Additionally, Converteam uses zenon's Industrial Maintenance Manager to plan and document maintenance tasks. Both Converteam (as the equipment supplier) and Converteam's customers, the ultimate end users, the operators of the cranes and industrial plants benefit in several ways from using zenon. For Converteam, zenon supports the configuration of equipment. Startup times are reduced for several reasons: adaptations are simple to perform; projects can be synchronized automatically; and clients can be launched quickly and safely. The user-friendly interface of the zenon editor enables even non-software specialists like startup personnel and technicians to work with the solution after a very short period of training. This has improved the acceptance of the software within Converteam significantly. The customers also value the numerous

advantages of the software. They profit from the openness of the system and can make small changes on their own. The software is based on Windows standards and enjoys a broad acceptance – which protects the investment. Additionally, the powerful information display in the central station and the error detection support increase the availability of the cranes. The state and alarm displays are user friendly and easy to understand, according to users. The openness of the system is also demonstrated in the ability to interface with other information systems and establish connections to error analysis tools, electronic documentation systems or overlying logistics solutions.

ZENON – PROVEN, FIELD-TESTED SOLUTIONS

zenon is used in the cranes of the world's biggest manufacturer ZPMC and also serves the cranes of Kocks Krane International GmbH. Customers such as HHLA CTT Hamburg, China State Shipbuilding Corp. and Eurogate in Hamburg and Bremerhaven benefit from the

competence of Converteam and the software from COPA-DATA.

Eurogate is a container-terminal and logistics group which operates sea terminals on the North Sea, in the Mediterranean and on the Atlantic, with connections to Eastern Europe. With nine terminals, and the handling of 12.1 million Twenty-foot Equivalent Units (TEUs) in 2005, Eurogate is the Number One in Europe. Converteam successfully installed cranes for a division of this transport and logistics infrastructure. This included 13 container cranes in Hamburg and 5 container cranes in Bremerhaven, each of which have already been - or are in the process of being equipped with zenon for crane management.

Karl-Heinz Schacht is pleased with this success: "Eurogate is one of the many satisfied customers who profit from our high quality project standards. COPA-DATA assists us as an experienced automation specialist and as a competent and reliable software provider. zenon meets our requirements and enables us to implement customer projects in a fast and competent way."



SCADA waste management and recycling.

Cawleys in Luton, United Kingdom, is a leading waste recycling company. Cawleys' business is to collect commercial waste and sort it to high grade material for recycling. The recycled material income offsets the cost of the landfill which is required for the small amount that is left over after sorting.

The company has just accepted a new sorting facility designed and installed by OKLM Recycling Technology, with DB Controls of Doncaster being subcontracted for automation, motor control and SCADA – for which they used COPA-DATA's zenon.

Cawleys offer a professional and expert service for waste management and recycling requirements. The company has been dedicated to recycling and diverting waste away from landfill since the 1970's when its first Waste Reclamation Factory was constructed in Luton. Since then the site has been developed and now houses a 40,000 sq ft Materials Recycling Facility which enables them to reclaim and recycle as much material as

possible.

The new OKLM reclamation facility takes material delivered in skips through a process of automatic and manual separation to sort out the main recovered recycling material types of Card, Polythene, Paper, Film, Plastic, Metal, Timber and Hardcore. The plant has many conveyors that transport the waste from stage to stage – at each step valuable recyclable material is removed until the final stage has residual material that can only go to landfill.

The separation uses various technologies, such as infra-red, magnetic, and sorting by blowers in a large rotating drum. Sorting operations are undertaken in two shifts. The plant has to run

at all times, with care being taken of safe working for operators and also to protect the machinery. This second aspect is of significance as the inverter-driven motors have to be able to cope with a wide range of loads as different material is moved by the conveyors. They have sufficient power to do much damage to the plant if left unsupervised, especially when an abnormal item finds its way onto the conveyor system, or build up of material causes a blockage.

SUPERVISING OPERATIONS

The whole motorised conveyor system is powered by a latest-generation MCC (Motor Control Centre) – designed and developed by DB Controls. The plant control room is fitted with the zenon SCADA system that communicates with various points within the MCC and also across the plant. The primary function of the SCADA is to provide safe and reliable plant operation. As with many SCADA systems colour is used to draw the attention of the operator to any problems, and also to provide an indication of how long a problem has occurred. An example of this is monitoring of the load of each drive; where this is measured as being above 80% for several minutes the colour of that area changes to red and the operator has to take action. Experience and common sense shows that such a load condition is likely to be a jammed or partially jammed conveyor, probably caused

by an abnormal item on the conveyor or a build up of waste material. To quickly check the source of the problem CCTV cameras are installed in many locations around the plant. The displays of material input and dispatch are shown on dedicated CCTV monitors in the control room. The internal CCTV cameras that monitor the plant are called up as and when needed by the operator using the SCADA display – a video window opens in the SCADA screen and a high resolution colour display allows the operator to quickly see the problem and then call a mobile operator over voice R/T, to clear the problem – keeping the plant running and protecting plant machinery.

In a similar way all key components in the plant are constantly monitored and kept running. Situations that do not require immediate attention are notified by a colour change to orange – drawing the operator’s attention to that part of the plant. When the screen shows all green, then all is well! All alarms are stored in an alarm list within zenon in chronological order.

The MCC has high technology inverter drives that allow the conveyors to run at the correct speed even though the loading may be continuously changing. Although the drive parameters were set at commissioning these can be displayed and changed directly in a zenon SCADA pop-up window – the window resembling the “hard” interface of the inverter itself. This avoids time-consuming trips to the plant floor where the MCC is posi-

tioned – the ease of use also encourages the supervisor to tune the plant to a new state should there be a significant change in the material being handled. In a similar way the status of all of the main devices within the MCC can be displayed on the central SCADA screen.

SCADA – MCC – CCTV INTEGRATION

System Integration was undertaken by DB Controls Ltd on behalf of OKLM, the main contractor. The zenon SCADA communicates with a Schneider Electric M340 controller that is at the heart of a Prisma Plus MCC (Motor Control Centre), using the standard zenon driver; the protocol being Modbus TCP/IP. The devices within the MCC each have an active web page that is accessed through zenon to open up windows on the SCADA display that show device parameters and status – using a standard zenon HTML picture.

The facility requires visual checking when an alarm is raised, this is provided by CCTV that is directly interfaced to zenon and appears as full colour video using the zenon video picture template – allowing very fast visual diagnosis of an abnormal situation. DB Controls technical director, Graham Allmendinger, said, “We fully utilised the complex objects and objects structure within zenon, this allowed us to develop and test each major control element and then re-deploy instances of them as

many times as was required in the project. This has significantly assisted us to produce a close to perfect solution prior to installation and commissioning. The system is fully accessible remotely at DB Control’s engineering office; this has also eased the tuning and resolution of residual teething problems.”

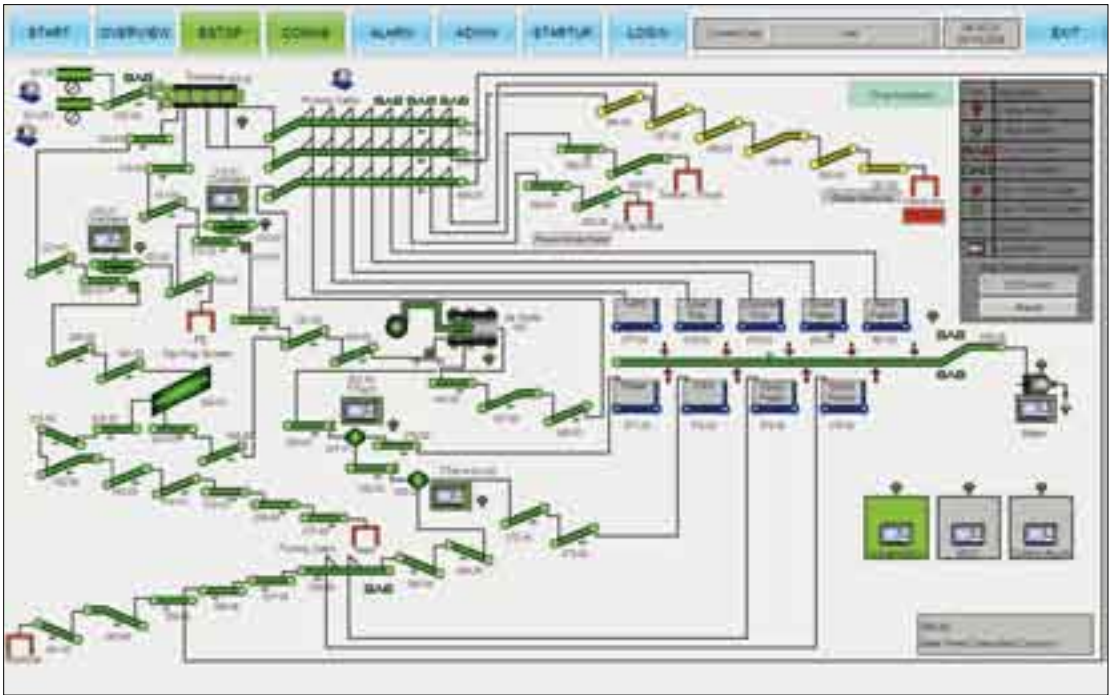
The system running at Cawleys is a full development system as zenon’s value makes this an attractive and affordable proposition for ongoing developments as these requirements appear.

IN OPERATION

Andrew Pegg, Cawleys Recycling Manager, “the system [zenon SCADA] allows us to stay in full control of our recycling – we could not run the plant without it”.

The system was commissioned on time and the first few months have shown reliable operation. User feedback is now being gathered to allow the specification of enhancements to the original system based on experience. One such addition will be an audible warning of plant status changes from the SCADA in the control room.

Waste management and recycling is an important part of modern life. The automation of such recycling plants has to be cost effective so that recycling can be efficient businesses. DB Controls use of zenon assisted in this objective and has resulted in a fully working system that was producing from the outset.



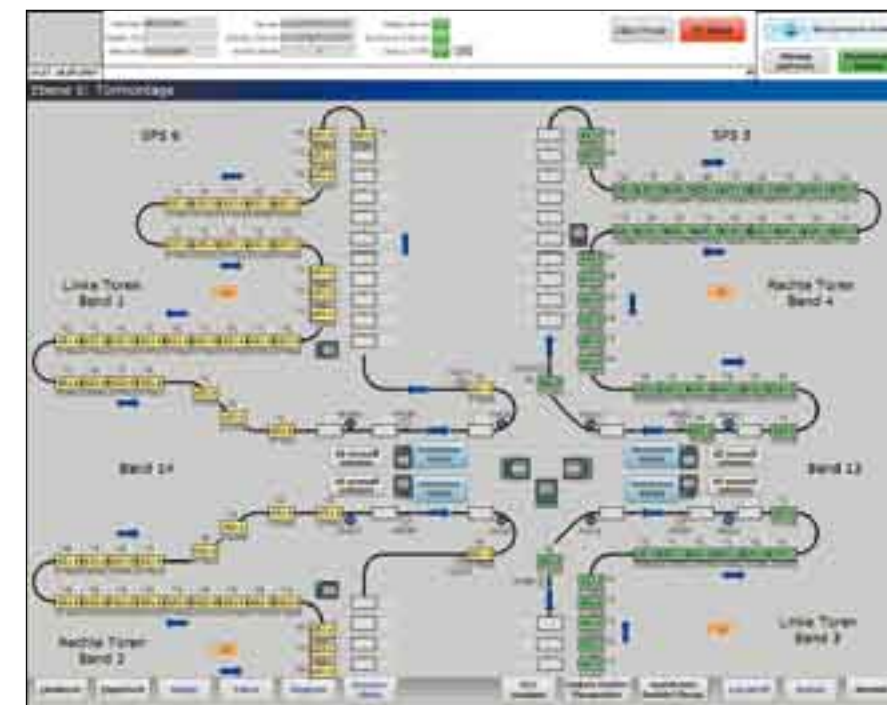
zenon – Greater flexibility in production.

The flexible storage and conveyor system in BMW's Dingolfing plant picks up all the doors from the assembly line and reunites them with the bodies at the right moment. This storage system, whose display requirements are handled by zenon, boasts a minimal space requirement whilst at the same time offering excellent flexibility.



During recent years the automotive industry has been transformed, and the final assembly phase has changed even more than others: the number of different vehicle models has increased, and a vehicle must be delivered to the customer as soon as possible after the order is placed. This is made possible by ensuring that production personnel are highly qualified and that production plants are regularly modernised or replaced. In the assembly section at BMW's Dingolfing plant - the

Group's largest production facility which produces around 1,200 vehicles every day - several thousand components are assembled to create a finished vehicle. zenon also forms part of the assembly facilities. This software is used for automation and visualisation of a conveyor system in the assembly plant. This is a flexible storage and conveyor system comprising electric vehicles, suspended electric trains and lifts. After painting, the doors are removed from body shells, and are then taken in lifts to the storage level; the doors for different vehicle types are all stored together. These electric vehicles then transport the doors for further processing, initially to the flexible store and then, when requested, on to the door fitting station. Once the body shells



have been completed, the doors are brought back to them for final assembly. The purpose of removing and refitting the doors in this way is that it is easier and more convenient for workers to carry out the necessary fitting operations on the doors. The body shells also take longer to assemble than the doors do, and so the latter need to be put into temporary storage in the best space-saving way possible. The new storage and conveyor solution was developed in such a way that it takes up very little shop floor space. At the same time, the overview is ensured: all doors are labelled (model, chassis number, door position, etc.), all load-carrying media are provided with RFID tags, and therefore the location of any particular door is known at all times. At various points in the plant are located distributed read/write stations that control and monitor the suspension gear routes that can be uniquely identified at each point. Users can read out the data, but also change and update it if necessary. To make the doors available at the right time and in the right place presents a particularly large logistical challenge; this is an extremely complex task for the control system to achieve.

CONVEYOR SYSTEM PROFESSIONALS OPTIMISE THE PLANT'S INTERNAL LOGISTICS

The company Staudinger GmbH supplies the software and the entire control system for the door conveyor system. Staudinger has developed a suitable custom solution for operation and visualisation based on COPA-DATA's zenon. This software depicts the entire system. This company, which is based in Loiching (near Dingolfing) was founded as long ago as 1950, and now

specialises in three fields: control systems, plant and mechanical engineering, and simulation modelling. Staudinger has around 150 employees, and produces solutions for challenging open- and closed-loop control tasks in all types of automation systems. This was the first time that Staudinger had worked on such a large product with zenon from COPA-DATA. Another partner in the project was the company Rofa Rosenheimer Förderanlagen GmbH, which specialises in automated conveyor systems for material flow and manufacturing.

COMPLEX CONTROL PROCESSES IMPLEMENTED WITH CLARITY

The objective for the door conveyor project at BMW's Dingolfing plant was to implement and visually represent the complex control processes necessitated by the storage system so clearly that the plant manager or maintenance engineer can always retain an overview and can see immediately the locations of vehicle bodies and doors. The flexible storage and conveyor system has a full graphical display. The system displays show the operator all the strands of conveying and storage. Each box in a storage strand represents one door or a set of two or four doors. The colour provides information about the vehicle type, and the status of the door's manufacture (unfinished door, fully assembled door, empty vehicle). In order for the doors to be fitted, a robot transfers them to the suspended electric overhead conveyor system for pre-assembly. This process, too, is visualised with zenon. Once the doors have been completed on the production lines they are moved back to storage to await the bodies. A sequence list is maintained to keep track of when cars are ready to have



their doors fitted. Light-grey boxes in the visualisation are unoccupied spaces in the storage and conveyor system. Before doors pass into the lines, a check is carried out automatically to determine whether a line of doors of the same type already exists. If it does, then the door will be stored there in order that separate lines are created for each model. There is likewise a colour to indicate when doors are re-fitted in the vehicle – like door removal, this is a process that is performed manually. When doors are removed from the storage and conveyor system, the empty hangers return to the door removal station – this completes the cycle, and the process starts from the beginning again.

The zenon overview display enables operators and maintenance engineers alike to zoom in on any detail of the plant whilst at the same time keeping the entire plant on the screen. “The overview display is for me one of zenon’s best functions as it hugely increases user-friendliness and enables the plant manager to work efficiently and retain an overview however complex the plant”, says Markus März, a control software designer at Staudinger GmbH who is responsible for visualisation systems.

NETWORKING, CONSISTENCY AND INHERITANCE

The basic idea behind networked visualisation is that operators can perform all the necessary operations at any time and from any position: defining parameters, switching units on and retrieving alarms and trend data. zenon’s consistency, in combination with its unique network technology, opens up all kinds of options for integrating and optimising production and information flows. Staudinger took advantage of this consistency earlier when configuring the visualisation system: The system planners have integrated the standard project specified by BMW and

used only a small part of it (fault reporting system) that they really needed. The cost is thereby greatly reduced, and efficiency increased. Object-oriented parameter definition makes system configuration very simple: as soon as an object has been defined centrally, it is available for use throughout the system. And whenever any item is modified, it is handed on down quickly, securely and accurately without any further input.

ALL EVENTUALITIES CALCULATED IN

The zenon application also enables data sets to be modified, moved or deleted, and it allows the data system to be accessed directly should the need arise. With the help of the relevant operation the controller can now determine which subsequent processes are necessary. This entire complex, yet flexible storage system is extremely user-friendly. This demonstrates the high level of automation and efficiency that is made possible by this software”, explains Markus März from Staudinger. To implement their solution Markus März and his colleagues had to calculate in all the possible eventualities in order to represent the necessary processes and other resulting processes in the solution: if, for instance, a door has been included in the wrong conveyor line due to a defect in the soft material, then this must be corrected immediately. The visualisation includes a wastepaper basket that the user can use to throw away any records that are not needed. Using drag-and-drop techniques, the responsible person can then move the door data to the correct position in the system. Markus März from Staudinger GmbH continues: “This entire project is visualised using zenon. With all its technically refined hardware and software solutions it is a truly state-of-the-art automation system which not only works extremely reliably, but is also unparalleled in terms of flexibility.



Engine conveyor systems are optimized with zenon.

For Audi Hungary based in Győr, COPA-DATA’s integrated software solution zenon, offered additional potential for optimizing its Engine conveyor systems: now zenon’s smooth flow of information enables more efficient operations.

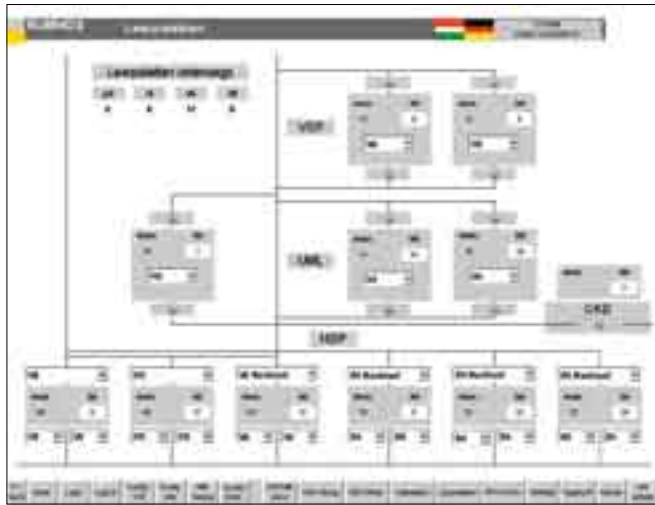
The Audi brand stands for progressive design, serious environmental protection and trend-setting technology, in short: “Innovation through technology”. The Hungarian Audi plant in Győr, with more than 500 employees, is part of this success story. Founded in 1993, the Hungarian plant manufactures up to 6,500 engines a day, starting with four, six and eight cylinders; all the way to ten cylinders and special custom made engines. All in all, Audi Gyor manufactures 1.9 million engines every year for use throughout the entire corporation including Audi, Volkswagen, Seat and Skoda. This success is made possible through sophisticated production and plant technology.

EFFICIENT INFORMATION FLOW ENABLES SMOOTH TRANSPORTATION

In order to ensure the continued success story at the Audi’s Gyor plant, the engine conveyor systems were earmarked for further expansion. The plant management decided to extend and optimize the facility by adding storage and automatic sorting mechanisms. The finished engines are transferred to the conveyor systems at dispatch stations on transport pallets. Audi wanted to improve this process so that important additional data like pallet number, engine number, engine type, reception station, dispatch station and other parameters could be submitted to the control system. Deploying COPA-DATA’s zenon software enabled them to do this.

The engines that have been dispatched from different locations in the plant are first buffered and sent to a pre-storage location where a rough sorting by engine type and reception station is done. From the pre-storage, the engines are transferred to a circulating store where the main sorting with ABC analysis takes place. From here, the engines are forwarded to the appropriate main storage location. The Gyor facility currently has two main storage locations and two reception stations. Because the reception station is already defined when the engines are dispatched, the delivery to the reception station or the main storage location happens safely and easily.

In the reception station the engines are pulled out of the main storage location



in blocks and then prepared for further transport. Additionally, the conveyor system has a reception station before the main storage locations. This way engines can, on demand, be pulled out of the circulating conveyer and sent directly to the desired dispatch location through a highway. This happens, for example, with custom made engines.

AUDI HAS THE PERFECT SOLUTION: ZENON

For an automated facility of Audi Gyor’s size, it is important to apply a control software solution that allows status and operating information to be visualized in a central location. The visualization software zenon has been successfully put to use at Audi to help deliver the current improvement projects. The project managers had already decided to use COPA-DATA’s zenon software for the visualization of the SKID facilities in Ingolstadt, Germany, as Johann Mayr, member of the Audi Ingolstadt’s planning group in electrical engineering explains: “We found a specialist for Industrial Automation in COPA-DATA. Their professionalism, from the planning phase all the way to implementation, has convinced us that with COPA-DATA we are relying on the right partner. The performance of the software confirms this again and again in each project. Together, we managed to create an innovative and safe engine conveyor system.”

There are a number of critical requirements the software solution had to meet:

- ▶ Runtime redundancy had to be guaranteed
- ▶ Guaranteed system stability
- ▶ Extensive alarm management with appropriate alarm statistics
- ▶ A clear depiction of the project structure
- ▶ Extensive and flexible user administration
- ▶ It was also important to have a universal solution, from the single work-station through to the Intranet.

Because the plant in Györ, Hungary, is an international Audi location, the language switch between German and Hungarian had to be guaranteed as well. The zenon software by COPA-DATA met all of these requirements: “The flexibility of zenon allows us to meet our requirements in a quick and uncomplicated manner”, adds Johann Mayr.

EVERYTHING AT ONE GLANCE – FROM ANYWHERE IN THE FACILITY

The individual components of the solution were deployed at numerous locations across the plant. The visualization has a Runtime server and a Standby server,

which are located in different areas of the plant for fire protection. The additional web server enables the depiction of the visualization on the Intranet. Two single workstation displays have been set up on the plant floor in the engine handling and maintenance offices. The receiving locations have a total of eight zenon Client displays at their disposal.

“Each employee today has access to all relevant information, in a fast and reliable way, which is critical in a manufacturing facility for competitiveness and success.” says Zoltan Ponty, Head of engine handling at Audi Györ.

ELIMINATING SOURCES OF ERROR AND OPTIMIZING OPERATIONS

In order to avoid sources of error in the future and to make the conveyor systems even more efficient, alarms have to be analyzed regularly and systematically. If an error has occurred, an alarm is immediately forwarded to maintenance by Message Control via SMS and e-mail. This helps to keep the reaction time as short as possible. zenon’s Industrial Performance Analyzer allows for a statistical analysis of errors. This tool displays frequently occurring errors in a transparent manner



and detects weak points in the facility. Additionally, the sophisticated monitor administration helps to make the Maintenance team’s work a lot easier: the process pictures are split between two monitors. This way, the user can have an overview picture displayed on one monitor and a detailed picture on the other monitor.

INCREASED TRANSPARENCY ALLOWS FOR FASTER DECISION-MAKING

The visualization of the plant encompasses the elements for display and input, as well as tabular displays of the occupancy of individual transport channels and storage locations. Together with COPA-DATA, the project team at Audi Gyor generated several status pictures that depicted the current condition of the individual transport channels through the use of symbolic elements. One of the conditions depicted was the direction the conveyer was moving. Additionally, the project-team created pictures that allow the setting and visualization of parameters for the facility, such as modes of operation or storage properties.

In order to generate these tables, Audi Györ uses the IEC 61131-3 programming system, straton. straton is able to take

over the complex calculations and regulations for process control and automation from the zenon Software. This embedded control system, or soft-PLC, is fully integrated with zenon in order to make engineering as easy as possible. The variable has to be created once only and is then available in both systems.

The occupancy of the conveyor systems at Audi Hungary is displayed in the control application by individual FIFO-components. These data components include the pallet numbers that are currently on the conveyor. As it’s not enough to just display the pallet numbers, straton ensures that each pallet number is assigned the respective pallet parameters such as engine number, type, reception station, dispatch station, etc. Up to 40 parameters per dispatched pallet can be retrieved. straton generates output strings that show the engines on a conveyor with all the additional information in individual pictures, either in groups or sorted.

DIRECT AND QUICK PAYBACK THANKS TO ZENON

For Audi Gyor the visualization of the entire engine conveyor system creates more transparency than ever. Each engine’s

path can be followed over the individual conveyors through to the storage location through the sorting facility all the way to the receiving location. This path can be corrected and redirected on demand. This enables constant checking and optimization of the sorting mechanisms. From the display terminals, the workers in the reception station can see exactly which engines will be received next and can make preparations for their receipt. The detailed alarm administration ensures more security and shorter reaction times in the case of a breakdown. High reliability is guaranteed by the redundant configuration of the system.

Thanks to the visualization of the facility, Audi Gyor today has a clear overview of the status and features of the engines, as well as all required actual and target values. The project managers Johann Mayr and Zoltan Ponty have already experienced the benefits: “zenon enables us to use our engine conveyor systems in an economical way. This year we have benefited from increased transparency and optimized operations. With the deployment of zenon we were able to respond to the growing requirements on us and a constant need to increase efficiency.”





Condition monitoring with zenon – all the key figures at the press of a button.

A streamlined production system is based on all the relevant key figures for production and performance always being available, and on production being standardised to the greatest possible extent. At Volkswagen in Emden, zenon is responsible for transparency in assembly, increased productivity and greater plant availability. Thanks to the zenon-based assembly information system, the maintenance engineers benefit from instant access to all production-related information and key figures.

The Volkswagen plant in Emden has a daily capacity of 1,200 vehicles, and has produced more than 9.5 million vehicles since the plant was opened in 1964. The Passat Limousine has been built in Emden since 1977, and the Passat Variant is only built here. The Emden site has been the leading plant in the world for this successful model.

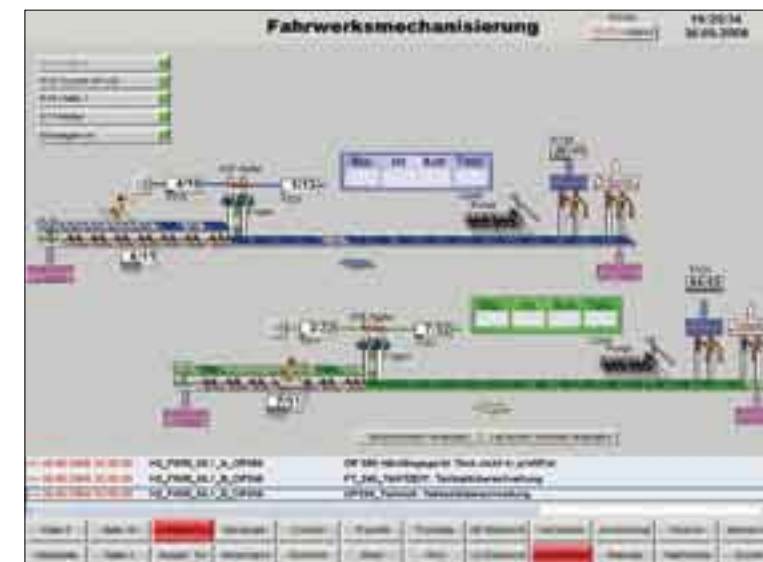
ZENON SETS NEW STANDARDS

Several generations of Passats have been manufactured here. Half way through 2003 the 12 millionth Passat, and in September 2004 the 13 millionth Passat from any Volkswagen plant was produced. The sixth generation of Passat Variant was launched in August 2005. In November 2007 Volkswagen in Emden produced its 15 millionth Passat worldwide. 2008 was the launch year for the new model, Passat CC, that is produced exclusively

in Emden. The launch of a new model is usually also the event that triggers investment in new machines and software. Volkswagen in Emden took the production of the new series of Passat models as a trigger for modernising the assembly plant and standardising the base software as well as the overlaid visualisation software. Here, the zenon software from COPA-DATA, which is used for the central plant monitoring system, has been setting new standards in production.

CONSISTENCY IN THE VW PASSAT ASSEMBLY PROCESS

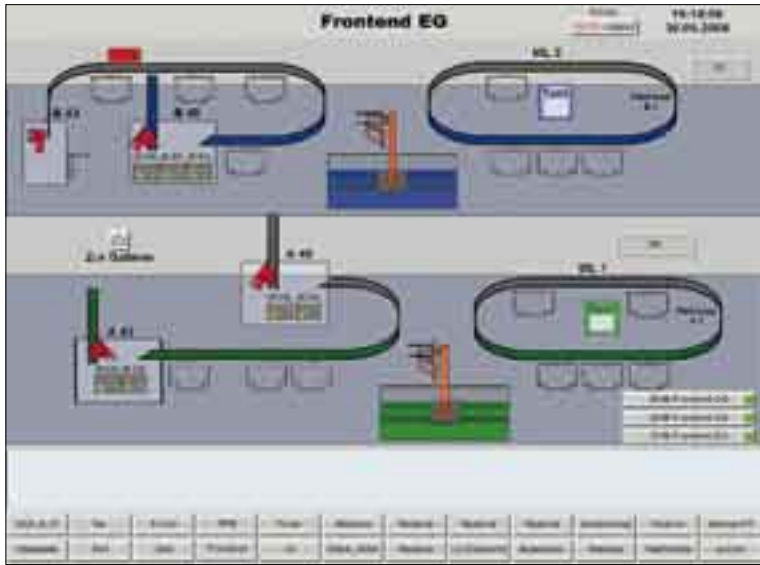
In the assembly process at Volkswagen's Emden plant zenon is now responsible for a total of four assembly shops as well as for communication with high level and low level systems, for the entire flow of information in the assembly plant and for preparing all the data for use in a high-performance, effective information system. There was no other system that was capable of satisfying the requirements of Volkswagen's project managers. An important evaluation criterion for zenon was its use of different controllers and its extensive integration ability. "Because of the increased volume of data in modern plants we were not able to capture data from all sections of the plant and to visualise it all. The systems were overloaded and grew considerably slower. A new solution was required", explains Mario Ewen, project leader at Volkswagen in Emden. In this case more than 120 controllers are involved – different models from different manufacturers. zenon visualises and oversees the entire production flow using more than 50,000 variables, which are



transferred to zenon. The entire assembly process is now visualised with 172 displays. Another incentive for developing a new application was the fact that the previous operating system, Windows NT, was to be discontinued. What's more, one of the tools used was no longer supported by the manufacturer. "Overall, the applications from our previous providers were no longer up to the job with the modern, upgraded structure. We compared a number of systems, taking into account our requirements, and reached the conclusion that zenon met all the criteria on our list. We are now using a consistent, standard solution for the entire assembly process", explains Georg-Joachim Loger, maintenance engineer at Volkswagen's Emden plant. This project was implemented by process management staff and production facilities management staff working with staff from COPA-DATA. Volkswagen was especially happy with the efficient direct approach and the readiness of the COPA-DATA team to try to give us everything we wanted as well as to incorporate changes as they presented themselves in the course of the project.

DISTRIBUTED, SECURE AND FUNCTIONAL

zenon features all the modern technology that a car manufacturer could possibly ask for. The Volkswagen software is configured as a client/server system with redundancy, and is therefore fail-safe. The internal network at Volkswagen now incorporates eight zenon clients. As well as the redundant server pair, there is also a database and a web server. The COPA-DATA web server serves 100 web clients simultaneously. The various process displays are brought up according to the specific task or functional



area. For storing and archiving data, the managers at VW decided on a (Microsoft) SQL-Server. The database is automatically populated from the zenon-SQL-Server connector, which also ensures that the data is read back automatically. Also included is a powerful user management module for defining access rights to the project and system. The user management module is used to specify which users are permitted to view or modify which functions – such as the shift schedules.

WELL-THOUGHT-OUT PROJECT STRUCTURE

The umbrella project, which integrates all the systems in the four assembly shops, includes the system overview displays, the industrial performance analysis, the production and facility manager (for the shift models), the higher-level alarm management, the chronological events list, counters and plant downtime, plus the initial project for the web client. The individual sub-projects include the system displays with detailed information, the driver links and control variables, alarm zones and the plant's shift reference.

ZENON – SUCCESSES BECOME MEASURABLE

One of the important goals for the new overall system at Volkswagen was to gain clear and total control over the assembly processes, both for management and for those working in the assembly shop. One of zenon's exceptional strengths is its ability to manipulate large volumes of data and to display them in a useful format to managers or those working in the plant. Volkswagen's main interest for its Emden plant lay in presenting the key figures for the production process and output in the form

of graphs and tables. The car manufacturer can now use these key figures to see how cost-effectively the assembly shop is operating. In other words, results become measurable. The key figures might, for instance, include target and actual values for the overall life of a production line, possible differences, the cycle times, the setting up of events in the plant and their causes, and the number of finished cars. Mario Ewen explains: "Monitoring the key figures ensures that the assembly process is running as efficiently as possible, and at full capacity. This system provides us with an overview of all the important information, allowing us to carry out detailed analyses and react quickly to events as necessary." Volkswagen could also use this data to detect any delays in the course of the assembly process and the causes, allowing an appropriate response. The integrated soft PLC, straton, which complies with the IEC standards, is used to calculate the buffer, unit, and output counters. To ensure that all the key figures reflect the assembly processes exactly, Volkswagen uses an additional zenon module. The production and facility scheduler (PFS) controls the chronological sequence of operations in Emden: at this plant a number of working hours models (shift system, lengths of breaks, etc.) are used. The shift hours entered from the PFS can be classified, grouped and evaluated. They are also fed into the performance calculations. "When all the figures are combined, they tell the story of how many cars we are actually producing. The opportunities for evaluating and monitoring our assembly processes are more detailed and sophisticated than ever before", observes Mario Ewen.

ALL THE KEY FIGURES, CLEARLY PRESENTED AND READY FOR USE

VW managers can view all the key assembly figures in either



All values displayed in the screenshots in this article are for illustration only.

table or graph form. Individual users can choose how they want the information to be presented. They can also select from many time scales, and different periods of time can be compared with one another. In this way, Volkswagen workers have access to extensive and at the same time highly condensed information that is available at the press of a button in the form of lists and analyses.

The report generator shows the archive entries in table form, and outputs the reports in HTML format - likewise either as a graph or a table. The Extended Trend module is provided for preparing data in graph form. At runtime users can arrange for various graphs to be displayed, and even for more than one graph to be compared. This ensures that all the relevant operators can view and use analyses, reports and graphs. "The central plant monitoring application is a tool for improving availability", explains Mario Ewen.

TOTAL CONTROL

The higher-level visualisation is now also used as a central point for all events in the plant and system messages. Volkswagen used to operate two systems for this purpose, but these have now been replaced by a single standard system. "As well as the system and plant monitoring we also wanted detailed analyses – on the one hand to ensure maximum availability and on the other hand to exploit any potential for optimisation", explains Mario Ewen of Volkswagen. All the operators now know instantly what they should do if they receive a system message, and can respond straight away.

Around 5,500 operating messages and system messages per day are produced by the assembly lines in Shops 1 (engine and gearbox), 2 (main assembly, drive assembly, disks, cockpit, etc.)

7 (headlamps, batteries, seats, wheels, doors, etc.) and 16 (initial assembly following paint). All the information is on hand to enable statistical evaluation and analysis with the industrial performance analyser. This information can also be viewed in the form of bar charts or pie charts. Filtering options enable online alarms, historical alarms, pending alarms or reset alarms to be shown, and to specify their display order: by time, class or priority.

At Volkswagen the alarms are also cleaned up at a break or shift change. This overlaid cleanup process ensures that overlapping messages are not only added, but that the net downtimes are taken into account in calculating the duration of an alarm. Every alarm that has caused a downtime is stored along with the possible discrepancy in unit numbers. The discrepancies are evaluated either individually or in total using the line, time, and shift plan filters, and are displayed on a zenon screen.

OPTIMISING MACHINES ACTIVELY

To ensure that the entire system can be serviced, maintained and upgraded efficiently, Mario Ewen and his colleagues have opted for zenon. It is important to the managers that all future system upgrades as well as all maintenance operations can be carried out without involving a service provider or other external partner. This saves both time and money.

The industrial maintenance manager is responsible for looking after the machinery and maintenance data. Service and maintenance intervals are easy to specify, manage and schedule, as are the detailed instructions. Those employees who are responsible for maintenance can now see at a glance when equipment, plant and machinery is due for maintenance. All maintenance operations are documented in logs.

zenon – an innovative solution is the engine of success.

Ford has changed significantly since the introduction of the Tin Lizzy. The cars may have changed, but innovation and modern production technology are still the main focus of the company. For the modernization of its forging and die-casting factory in Cologne, Ford relied on COPA-DATA's software solution, zenon.



The name Henry Ford stands for inventive talent, ideas and innovations. He introduced the assembly line, he relied on the standardization of components and he led the company to success, thanks to rationalization and division of labor. Today, Ford plants still regularly modernize and optimize existing machinery, in order to stay competitive. The current

considerations for Ford's forging and die-casting factory in Cologne focused on how to raise the quality and productivity of the equipment there. "Above all, we wanted to check the effectiveness of the machines that produce transmission components and engine parts", explains Frank Tils, project manager of process visualization, in hall R at Ford-Werke Köln GmbH.

HIGH EXPECTATIONS

Together with his team, Tils aimed at maximum system availability to ensure smooth production and quality control. For this, they tested and rated different process control systems for their suitability, among them zenon from COPA-DATA. zenon had already been introduced to some parts of the plant, but now the engineers wanted to review its performance in terms of downtime analysis. Basic requirements were:

- ▶ continuity,
- ▶ Scalability, and
- ▶ modular structure.

In addition, the solution had to allow for the use of other controller hardware.

Other important goals of the project team at Ford included:

- ▶ vertical integration so that information can be shared with the management level, and
- ▶ simple and safe maintenance.

Frank Tils was looking for a process control solution that is so simple to use that the service personnel could perform modifications quickly and easily. Even if they don't have programming knowledge, the users should be able to adjust

visualization projects. Besides visualization, the process control system should also allow for machine data acquisition and failure statistics.

VISUALIZATION, MDE AND PERFORMANCE ANALYSIS – ALL IN ONE

After the evaluation of the several short-listed systems, Ford chose the software solution of COPA-DATA. zenon: "zenon is powerful, easy to use and very flexible. For example, we can adjust projects even during runtime", explains Frank Tils. Another important reason for selecting zenon was its scalability: ranging from the machine-oriented operation at the Windows CE-Panel to the control system on the PC. Thanks to that, projects can be created platform-independently in a single development environment.

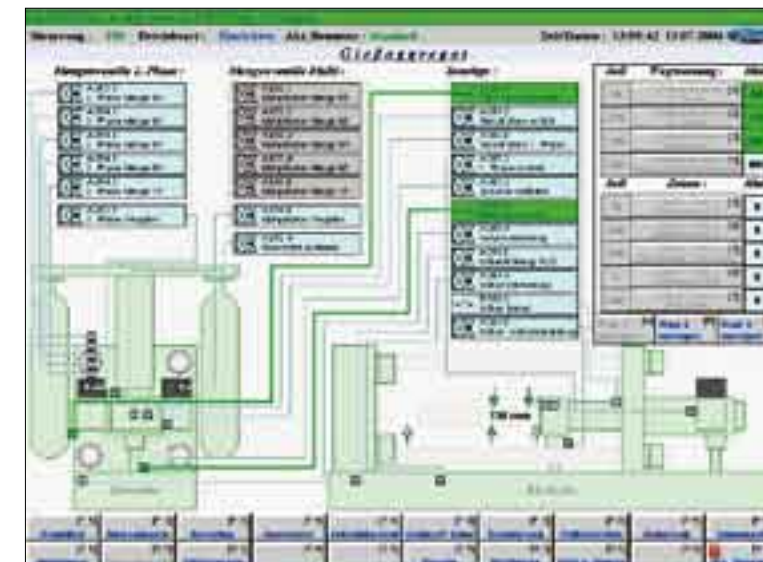
Over 300 drivers guarantee compatibility with all PLC and bus systems on the market. Furthermore, the user can link different zenon projects in a safe and powerful way and configure database connections simply by using parameters. The Industrial Performance Analyser of zenon 6.22 allows for a statistical analysis of error messages. Ford's Frank Tils says:

"This tool [the IPA] enables us to make a very detailed analysis of facility downtime and the reasons for each instance of downtime." The project manager expects an additional rise in the efficiency of production from their new ability to analyse downtime effectively. The IPA also offers a detailed report of past messages and failures for later analysis.

TOP PERFORMANCE REQUIRED

The new process control system easily meets the high demands of the production environment at Ford-Werke Köln GmbH. For example, zenon provides clear and simple visualization of the procedures during the production of a die cast component, thanks to the numerous display options of moving picture elements.

"In case of machine downtime we can get a fast and detailed understanding of the causes for that particular case of downtime. As a consequence, we can react quickly and apply counter-measures to reduce downtime", says Frank Tils. Thanks to zenon, Ford now uses a special system to identify the machine operator at the process control system. As a result, there are generally fewer input errors today. During machine operation, the zenon archive server also records production and machine data. The machine operator can view this data in a row, in trend curves or in a report. This allows a comprehensive overview of the current production process. Ford plans to develop the system in the future, and a zenon web server will be deployed to provide relevant production data for management via the company network.





zenon brings precision to a manufacturing operation.

Welding, bonding, riveting, screwing – in vehicle body construction several hundred components are combined to form a single finished product. Nowadays industrial robots and state-of-the-art technology ensure that vehicle bodies can be produced to the most precise specifications. zenon is an automation and visualisation tool, representing production processes in detail and offering control of all aspects of these processes.

With a degree of automation of between 90 and 95 per cent, vehicle body construction represents the most automated area of automotive production. Industrial robots finish the individual components from sheet aluminium or sheet steel here. The sheet metal components of a vehicle bodyshell are first joined to form smaller assembly groups such as doors, front section or floor assembly, then welded, bonded or screwed together. A vehicle body consists of several assembly groups that are manufactured in advance on separate welding lines. Increasing automation in the automotive industry means that production plants and systems must be monitored and controlled ever more efficiently. Moreover, as the degree of automation increases, more and more data is produced that needs to be analysed quickly and with great precision. This is why zenon is of such interest to the

automotive industry. The BMW Group has been using zenon in different divisions and plants since 1999 – and now it is introducing zenon in vehicle body construction too.

ZENON OFFERS EXCELLENT CONSISTENCY AND HARDWARE INDEPENDENCE

Users are now benefiting from the many advantages offered by the zenon software. The system is scaleable, hardware independent and consistent, and the software runs on CE machines just as efficiently as on PCs. zenon's consistency means that configuration procedures only need to be carried out once, and this allows the user to make significant savings in terms of both time and money. The new display system also allows the S7 graphical sequences to be diagnosed in detail. zenon Runtime displays

the sequence data from the S7 graphical sequences. The data is copied automatically from the programming software. In this way, users can monitor the statuses of the sequences independently from the programming system. At run time zenon shows a graphical display of the currently active steps in the PLC together with their statuses. All this information can be subsequently evaluated and analysed. In the event of an error, this module will carry out a heuristic evaluation of the disrupted step and will then deliver a probable cause of the error in the form of plain text. Another advantage to the COPA-DATA solution is that zenon scores a lot better than competing products in terms of the big financial/economic picture. This takes into account licence costs as well as configuration and training overheads.

HIGH LEVEL OF AUTOMATION IN CONVEYOR SYSTEMS AND MANUFACTURING

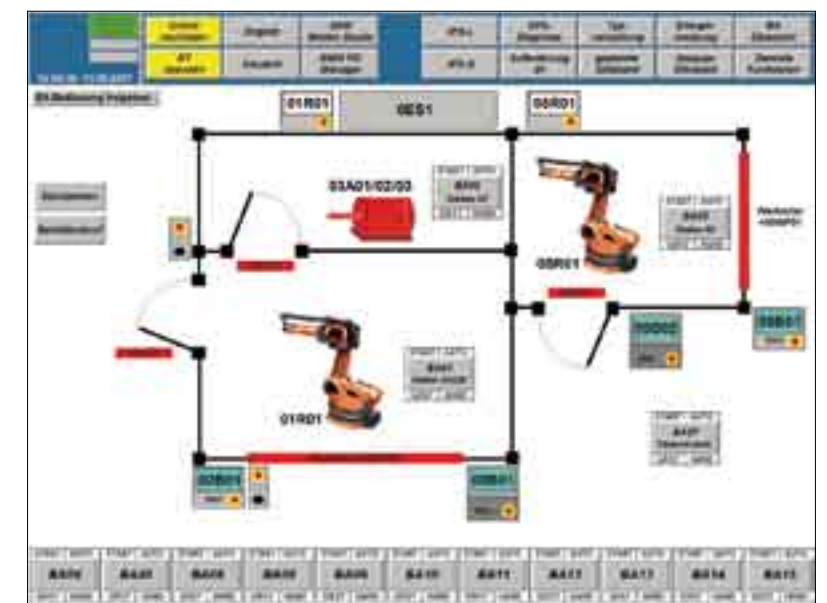
In vehicle body construction, bodyshells and other components such as doors and covers are manufactured. The sheet metal parts are produced in the pressing plant and then transported via conveyor systems to the manufacturing facilities, where the process is continued. Each of these plants is subdivided into various different manufacturing cells known as operating mode sections (BA). Each operating mode section represents an autonomous sub-cell in technical and organisational terms. A system can comprise of up to 15 operating mode sections and uses an S7-400 as its central controller. All the connected processes, including robots and the safety system, are linked via Profinet.

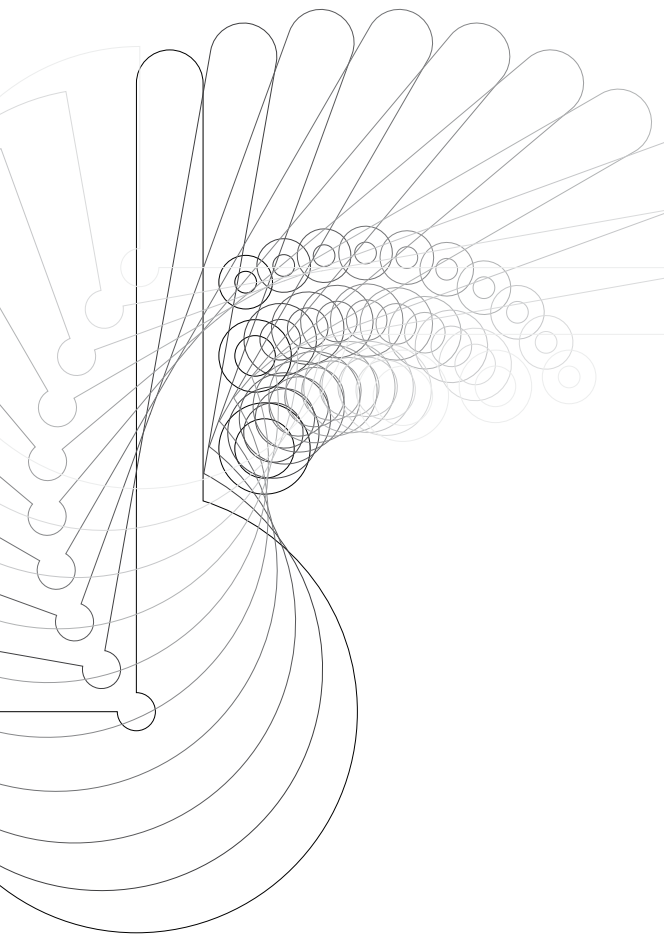
This control system, together with the display computer, is installed in the central BVS cabinet. "BVS" stands for "bedienen, visualisieren, steuern" (operation, display and control). In the central station zenon assembles all the data for control, monitoring and inspection, displays it and prepares it for the higher-level statistics system. The operators also use zenon if they need to make any kind of manual intervention in the manufacturing process. Distributed stations, most of which are based on zenon CE, enable local display and operation (BVO = Bedienung-Vor-Ort (local operation)).

By way of example, is a task that may be performed in the plant: the sheet-metal parts are positioned, fixed in place with clamps and then welded or bonded together. These processes are performed largely by robots. Different measuring methods (including ultrasound and laser) must be employed in order to check constantly and thoroughly to detect any positional deviations in the bodies or other parts at an early juncture. The conveyor system brings the separate components in and carries the manufactured bodies out. zenon provides a visual display of all these processes.

PLANNING IS THE KEY

Definition of standards represents a tried-and-tested means of setting up a project efficiently and implementing software. This includes the definition of functions that the finished system must offer, the special characteristics that need to be included in the corresponding production process, together with the





interfaces and the visual presentation. Once these pre-defined standards and methods have been successfully tested in a project or a system, then the user can use them at different production facilities throughout the company or group of companies.

STANDARDS ENSURE REUSEABILITY AND EFFICIENCY

The relevant personnel have developed and documented sample projects for these standards, which define the functions, visual appearance and interfaces. Based on these sample projects, system projects can be set up quickly and effectively either now or in the future. The sample project contains templates for the display objects. Thus pre-defined data types for communication are stored, and these already contain all the necessary elements such as value ranges, limit values, colours or graphic objects. Based on a data type, the variables for the display are then created. Here, the variable name and the PLC start address must be specified. All its other properties are already stored in the data type, and the variable inherits these automatically. Graphical symbols are stored in a library for creating system-specific images. For instance, one graphical symbol will represent a

robot and another one will represent a conveyor. The graphical symbols contain all the graphical properties of the object, and match the data types. If the display is created using drag-and-drop techniques, then a logical link is automatically established between the graphical symbol and the variable.

AVOIDING PROBLEMS AT AN EARLY STAGE

In zenon, alarm processing shows detailed messages in such a way that the plant operator can rectify the cause of an error rapidly and, if possible, without any help from the maintenance engineers. For alarm definitions, too, the planners and responsible personnel have drafted templates for PLC programming to ensure that the messages always contain the required details – on the one hand for the plant operator, and on the other hand for the purpose of statistical analysis. The details in question may be the operating mode code, the operand (physical address) and the operand's symbol name ("Forward movement at rear") for easy identification and labelling for a radio communication system. Apart from alarm management there are also many other advantages and strengths to impress users in the automotive industry: The zenon solution ensures flexibility, consistency and quality in production.



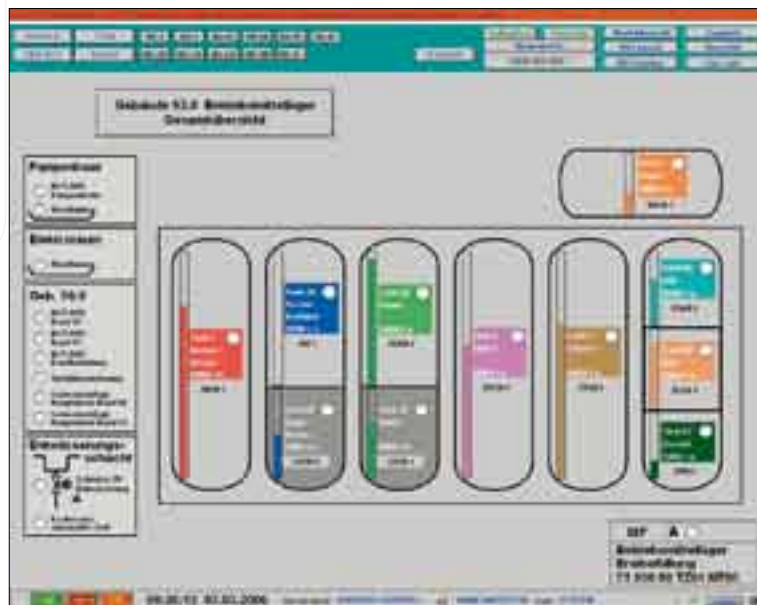
Operating technical facilities efficiently and safely.

From the very start of the planning process, BMW decided to use only the most modern building automation technology for optimal operation of the technical facilities and buildings - with minimum personnel expenses. The project implementation was entrusted to Cegelec, while zenon by COPA-DATA GmbH was chosen as the software for building automation.

If the facilities of a company are not operated and managed efficiently, costs will rise and resources will be wasted. BMW Leipzig therefore decided to strike a new path. Already in the design phase, BMW Leipzig aimed at creating an efficient, reliable and secure system with the new building automation technology; a system that would monitor, control and direct the technical facilities. In cooperation with Cegelec, facility and automation technology GmbH & Co. KG, from Frankfurt, BMW designed an integrated control system for the complete technical and electrical facility equipment. All relevant subsystems are connected with standardized, open and mostly non-proprietary protocols. The communication between these components takes place via TCP/IP in the network of BMW.

ANALYSIS AND OPTIMIZATION

Building automation technology displays the operating conditions and technical parameters with clearly structured facility pictures: altogether, it processes about 53,000 real data points



(sensors, actuators and readings) and 70,000 virtual data points from different information sources (data collection points, control cabinet with PLC) of the whole plant and it visualizes operating conditions with over 1,500 facility pictures. With zenon software by COPA-DATA and the project implementation by Cegelec, BMW can now get a clear overview of all cost-relevant processes concerning their technical facilities and buildings. This allows for professional facility management and plant control. The data collected in building automation is based on a newly developed equipment identification system (AEI). This system identifies all the components of the technical and electrical building equipment, even the passive components of the IT, across different assembly sections.

THE LOGICAL STRUCTURE OF THE AEI SUPPORTS AN EFFICIENT ALARM MANAGEMENT

Process management by operating personnel makes it possible to run all technical facilities in the Leipzig plant in an efficient, energy-saving and cost-efficient way. Required parameters that are not generated on field level (like performance data) are calculated in the building automation system. The solution saves all parameters in archives and provides reports for individually configurable trends. The powerful zenon SQL interface stores relevant values in an Oracle database for a long-term plant optimization. These values include meter readings or detailed consumption data. Collecting this data makes it possible to optimize control loops. BMW, for instance, calculates the NET value (Normal Effective Temperature = temperature as perceived by employees) from temperature, humidity and air speed and displays it online. Kurt Fingerhut, manager at Cegelec and

responsible service provider for this project at BMW Leipzig, explains: “BMW has created the foundation for efficient energy and cost management, because all information about all buildings and technical facilities are available for analysis at all times.” Building automation with zenon® makes it possible today to change all relevant target values either manually at the work place or automatically through an interval timer program.

For this purpose, the convenient Production and Facility Scheduler of zenon is employed. This allows, for example, for the flexible operation of ventilation facilities in different operating and load conditions. A further example: The responsible employees can control all lighting systems (manually through the user interface or automatically depending on lighting and time conditions) and therefore adjust them to the changing requirements of the production flow.

WORKING EFFICIENTLY WITH MINIMAL RESOURCES

It was very important for BMW to combine flexible workplaces with relatively low license costs. The integration of all technical systems administered by Facility Management into a superior building automation system makes it possible to control the whole plant from a relatively small control room with two redundant zenon workplaces. The operator can watch, control and direct the facility processes here. An additional stand-alone server is used as an engineering workplace for future maintenance and optimization processes of the system. Apart from the two fixed workplaces in the control room, there are only about ten laptops that are used as additional zenon operating stations. On these laptops, employees of Facility Management can watch and test technical facilities. Because of the system concept and



the high availability of the GLT, BMW Leipzig decided against fixed on-site operating stations and saved costs for hardware and software.

SECURE SERVERS CONTROL THE FACILITIES

The system concept of building automation consists of two redundant zenon servers, which are installed in the two computer centers of the plant. They form the central element of the building automation system and they control the entire communication with the underlying information sources of the automation level and the connected operating stations. Furthermore, those two servers handle data administration, data archiving and many other additional functions of the control system software.

These functions include performance calculations and interval timer programs. With these functions, all the relevant target values and operation modes of the building-specific systems can be adjusted according to the different operating, load and time conditions. If production is active in a hall, the temperature is automatically lowered if it is getting too hot in the production halls. The IT department is in charge of server operation and data backup. The two servers for building automation, which are running Windows 2000 Advanced Server, are on the same level of availability as the servers in vehicle production. The plant's Facility Management is responsible for the operation and maintenance of the application software zenon.

ALARM MANAGEMENT FOR SECURITY

Alarm message handling and failure resolution is another important process in building automation. BMW Leipzig decided

against the installation of permanently recording alarm printers because of the high availability of the complete system and the possibility of access from every spot of the plant via mobile computers. Instead, powerful color laser systems deliver all the lists, hardcopies and protocols, in color and in sizes up to A3. Two separate alarm systems were designed and implemented, in preparation for running the control room with reduced personnel. The most important alarm groups of the building-specific facilities can be transferred to the permanently occupied work places of the factory security offices of the Leipzig plant.

Failures of the plant-wide infrastructure (e.g. compressed air, heat and power supply) are reported additionally via SMS to the stand-by duty of the Facility Management Provider outside of the plant. For this, the project team at Cegelec has developed an interface for the automatic transmission of alarm data to an SMS server, which was installed for the whole plant.

COMPLETE MONITORING AND CONTROL

The new system for building automation was tested thoroughly over several months – under the most demanding conditions: The system survived a plant-wide blackout of the power supply without problems. Kurt Fingerhut summarizes “We were able to reach all the goals that we had in this project: Complete monitoring and control of the facilities with minimal use of personnel and resources.” Professional building automation creates possibilities for cost reduction and delivers a significant boost of effectiveness. BMW was able to tap those possibilities for cost reduction thanks to the technical possibilities of the zenon software.

Kickoff with COPA-DATA in the Allianz Arena.

From match day to match day, the Allianz Arena shows us how perfectly organized a football stadium can be. Ranging from the individually controllable lighting system and the sophisticated building control to the efficient security measures. This can only work when the different technologies and products are perfectly coordinated and visualized for the control room. This job is done by zenon, which was the only HMI/SCADA system to fulfill all the requirements of the operators regarding flexibility and compatibility. zenon maintains an excellent overview, puts all the important processes on the screens in the control room and even keeps watch in unoccupied stations, if necessary.



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OPEN AND INDEPENDENT

One of the biggest challenges in the Allianz Arena was to maintain the overview in a complex system and to ensure the smooth interaction of all components. COPA-DATA Sales Manager Hans-Peter Ziegler: "Today, it is easy to monitor and control all sorts of things, but the problem usually lies in the overview and the appropriate visualization. It is important not only to realize that something happens, but also to see at a glance what is happening where. Preferably, with clear messages that leave no room for interpretation to the technician; this is the only way he can react quickly and correctly." For zenon, this means displaying a few thousand sensors and many different signals in a clear and concise way, so the operating technician gets a clear overview. Complex processes are supposed to be packed into simple symbols and messages. Hans-Peter Ziegler explains: "If you want to use the best technology in every subsystem, you often have to coordinate very different systems. With zenon, we can correctly receive, interpret and forward a large amount of data and signals from different sources in a very safe and straightforward way. The main task of zenon is to merge all the substations and connections into one zenon integration project, creating a clear overview. " zenon makes life easier for engineers, when it comes to integrating different types of hardware and software. On the one hand, zenon brings along over 250 fully developed drivers. On the other hand, it enables engineers to create their own individual connections, for example with VBA. For controlling the exterior lighting, the engineers can access the colored neon lamps quite simply and create shining colors on the stadium's 24,500 m² of membrane exterior cover.

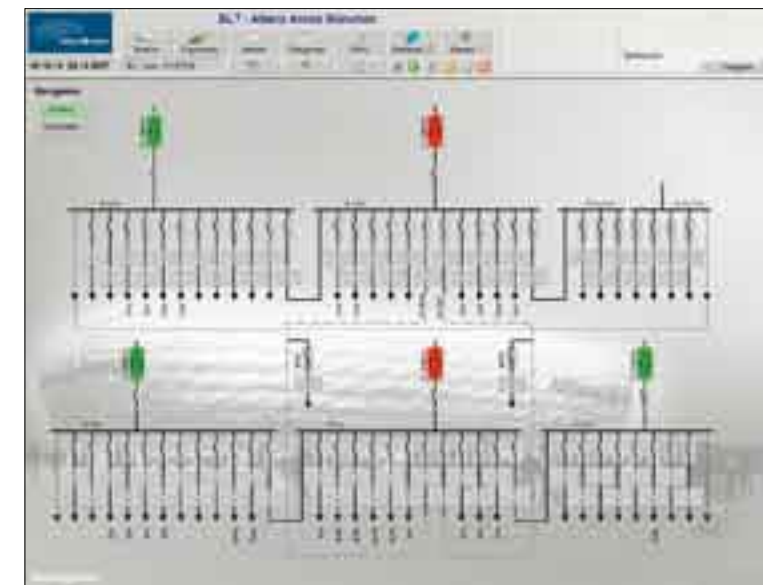
COPA-DATA also feels committed to making work easier for the users. Easier, because they can see all the important information at a glance. But also because they can handle the system in an intuitive and simple way." The technicians in the Allianz Arena highly appreciate the fact that they can usually work with their familiar user interface. By the way, this is one of the special advantages of zenon: The integration of applications into a uniform user interface. It works with the different Windows operating systems and cooperates with the most different kinds of hardware and software. This is due to its consistent design, the variety of drivers and – not to forget – its well-engineered security mechanisms.

ZENON – ON THE BALL LONG BEFORE KICKOFF

Attractive matches fill the stadium up to the roof in a height of 52 meters. On seven levels, the perfectly engineered infrastructure bestows an untroubled match experience upon an audience of up to 70,000 people: quick yet safe access control, simple paths to the viewer seats, climate control adjusted to every situation.

Long before kickoff, the systems in the stadium are launched; the energy supply is checked, the electronic access control with video surveillance provides for a smooth stream of visitors and high security. All of this happens without much effort; the organization of a match day's procedures is pre-programmed quite simply on the PC. After entering time and date, all the necessary actions are launched in the background. All employees of the Arena are equipped with transponders, which enable a constant surveillance of accesses and routes traveled. The access to the





stadium without transponder or a valid ticket is de facto impossible. The control system keeps a seamless record of all actions and messages and the sophisticated filtering and sorting functions of zenon give a comfortable overview in the flood of data. With a mouse click, the currently important data is filtered out. Security is of course an important issue, also for the HMI/SCADA system. We were able to provide the operators of the Allianz Arena with a user administration system, which fulfills even the extremely strict requirements of the pharmaceutical and food industry. User rights can be defined very exactly and individually, and each manipulation of the system is recorded in detail.

SNMP – ALL CLEAR IN THE NET

A stadium as big as this depends on a high-performance power supply. zenon Product Manager Reinhard Mayr: “In the case of the arena, we are talking about a 12 Megawatts power input. Two independent transformer stations guarantee a seamless power supply. This puts fail-safety on top of the list. We advise against any compromises here. Redundant wiring, distributors and networks are a must.” In the Allianz Arena, the energy infrastructure is also monitored by way of SNMP. With a few mouse clicks, SNMP-compatible components are read out and their data points are created. Per drag & drop, they can be put immediately into the appropriate process pictures. Without disturbing or even interrupting the system, the altered process pictures are transferred back via Hotreload. Consequently, new components can also be added without problems. The combination of redundant components and zenon functionality guarantees the seamless availability of power supply in the Arena.

OVERVIEW IN THE CONTROL ROOM: AUTOMATIC MESSAGES AND REMOTE CONFIGURATION

The central control room is constantly collecting all information and interpreting it. The interpretation is so clear and concise, that one single person can handle the control room during calm phases. Even during peak periods, the overview is always maintained. The best foundation for this is exact planning – the Extended Trend Module (ETM) of zenon does just that. It shows current or archived data and creates the foundation for exact evaluations. For example, the operators get an overview of power consumption, visitor streams, parking-lot utilization and much more – at present or over any space of time. With this reliable basis, developments and requirements can be predicted and consumption peaks can be anticipated and their impacts reduced. Additionally, the zenon Web Server supports the technicians. It always displays the system in its current state and with the same familiar interface as on the terminals. The technicians use web clients to access the system directly, which enables them to react quickly to alarms, even from outside the control room.

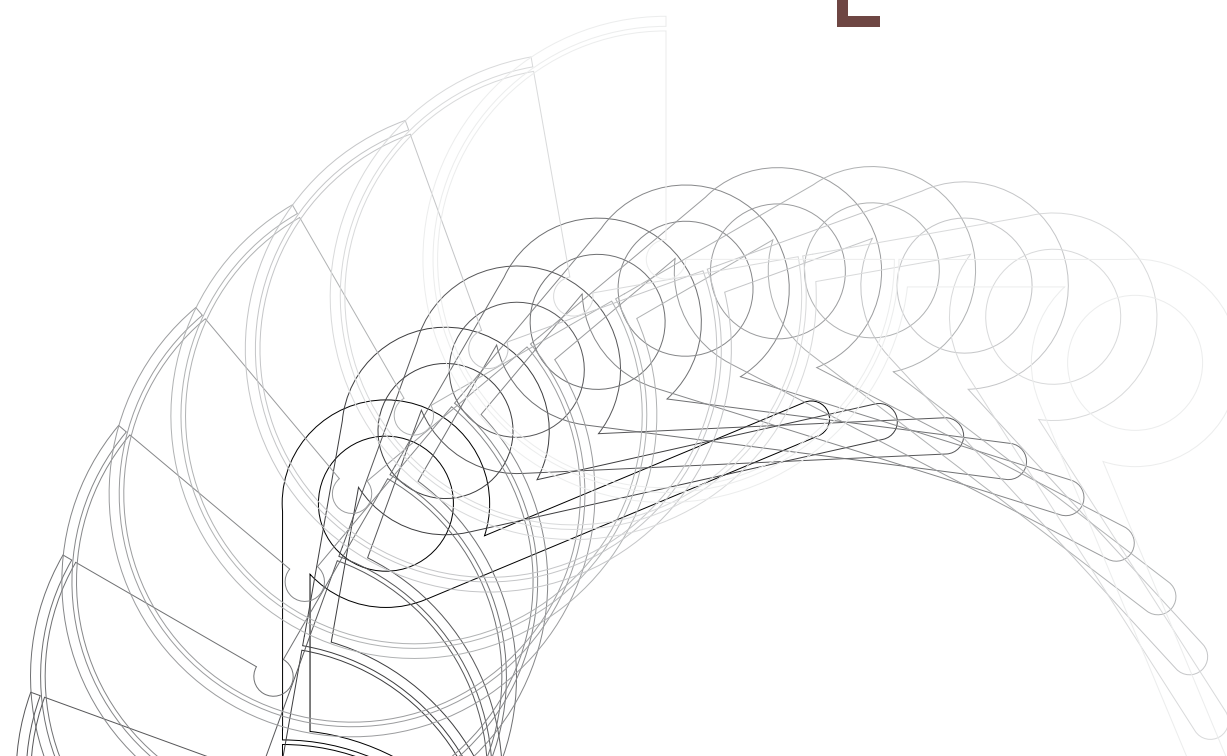
On match days, the central control room is filled with technicians. They monitor and control lighting, network, access control, parking lot, ventilation, heating and cooling. Things are getting busy and everybody's full attention is required. Now, they are profiting from zenon's multi monitor technology. Multiple screens show all the important information simultaneously, so that nothing of importance gets out of sight. Nothing can be overlooked; potential problems are recognized from the very start.

AROUND-THE-CLOCK

During its operation, zenon handles thousands of data points, prepares and archives data and transmits clear messages. Modules like the Extended Trend Module (ETM), Archiving, Alarming, Scheduler, but also SNMP and Beckhoff drivers, VBA macros and many other zenon features are active. They guarantee a safe power supply, they monitor entrances and parking-lots, check the UPS or alarm technicians, if necessary. And when the lights go down and the parking lots become empty and the building services are shut down to a minimum after a long match day, zenon stays vigilant and keeps watch.

ZENON IN THE ALLIANZ ARENA – A SUMMARY:

- ▶ Control and visualization of the complete building services
- ▶ Smooth integration of hardware from different providers with our own drivers
- ▶ Open interfaces for VBA and OPC
- ▶ High security standards
- ▶ Multiple project administration
- ▶ Simple administration and monitoring of network devices with SNMP
- ▶ Analysis and forecast with the Extended Trend Module
- ▶ Web server technology for remote administration





Using energy efficiently.

Simple management of the technical systems in a building and efficient monitoring of all the equipment and systems is the dream of every facility manager. zenon turns this dream into reality. One site to benefit from the zenon system is the Montblanc site in Hamburg, with its workshops and administration building.

As an open, manufacturer-independent system, zenon is ideally suited for use in a building management system. The visualisation and monitoring of operating states and the optimisation of operating modes in complex systems enables a building to be managed efficiently. zenon communicates with the automation level via standard interfaces like OPC (OLE for Process Control), LON (Local Operating Network) and BACNet (Building Automation and Control Networks). Every event, such as the failure of a unit, the violation

of a limit value or any type of error message is displayed and managed in the system. Loading patterns (power consumption over a period of time) and temperature graphs are stored in zenon's long-term archive. The facility manager can retrieve this information using the zenon "Extended Trend" module. The information is also available in the form of reports for the purpose of precision analysis. zenon thereby creates a facility for monitoring complex technical systems and control-engineering processes, but most importantly for oper-

ating these systems and processes in the most efficient way possible. This is also the task that falls to Claus-Dieter Brandt and his colleagues who are responsible for operational systems at Montblanc, the traditional company based in Hamburg. The team must respond quickly to fault messages and either restore the functionality of the device or the system or start repair work – this applies to the production facilities as well as administration. "Our particular challenge in building management systems is to reflect growing structures

and changes in a company as quickly as possible, and to monitor all systems efficiently", explains Claus-Dieter Brandt, building technology manager at Montblanc Simplo GmbH in Hamburg. This company is now characterised by growth because the demand for Montblanc products is stronger than ever. For several generations Montblanc has been well-known as the manufacturer of exclusive writing equipment, and more recently the company has also established itself as a supplier of watches, jewellery and leather items in the luxury goods sector.

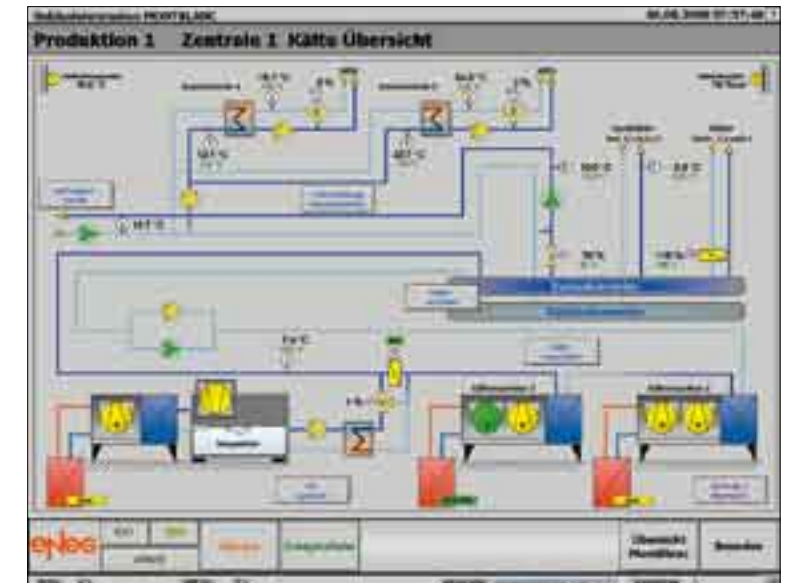
WRITING CULTURE AND CRAFTSMANSHIP

These exclusive products are produced by Montblanc, which was founded in 1906. They satisfy the strong demand for traditional European craftsmanship and timeless design. Montblanc employs around 2,400 people in 28 subsidiaries, and supplies its luxury products to some 6,000 retail outlets in 70 different countries and to 70 Montblanc boutiques. Montblanc belongs to the Richemont Group, which was founded in 1988 and is based in Geneva. The Group specialises in luxury goods, and its member companies include the renowned jewellery and watch firms Cartier, Piaget, Van Cleef & Arpels, IWC, Jaeger-LeCoultre, Lange & Söhne and Panerai. The Group also includes other well-known names such as Dunhill, Baume et Mercier and the fashion company Chloé. Montblanc manufactures its products in Germany, Italy and Switzerland in order to use and also to preserve the expertise of traditional European craftsmanship. Montblanc produces its writing implements at its original factory in Hamburg. The process is still very much a manual one involving the skill of craftsmen, and production remains centred on the artisan's studio. These studios produce very limited numbers of ornate collectors' pieces and individually made special editions. Not only

are the artisans' studios located in Hamburg but also the company's main administration and international headquarters. Montblanc has around 1,000 employees based at this site. The production branch of the company is called Montblanc Simplo GmbH. It is located in Hamburg and has 820 employees.

ZENON OFFERS SECURITY AND PROTECTION OF INVESTMENT

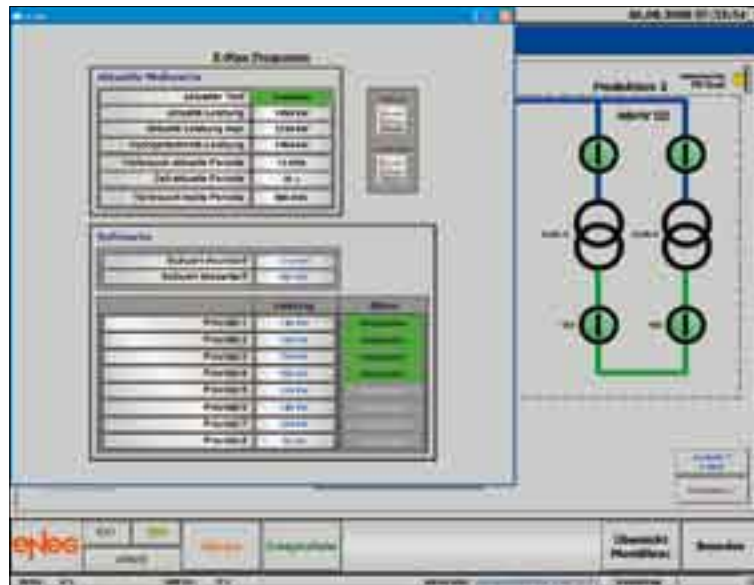
Montblanc sets very high standards for safety, comfort and air conditioning in its production facilities and administration offices in Hamburg. At the same time the company aims to keep power consumption and operating costs to a minimum. Claus-Dieter Brandt therefore set out to find a building management system that would be capable of meeting these criteria. "What we were looking for was some standard software that would offer protection of our investment. It was also important to us that we could count on professional support from experts and professionals while installing and operating such a system", explains Claus-Dieter Brandt. Montblanc has chosen the COPA-DATA system



partner eNeG to work on this project. eNeG is also based in Hamburg, and specialises in designing and installing intelligent building automation systems based on BACNet, LonWorks and Profibus, eNeG works with state-of-the-art components and makes certain that they interact perfectly. eNeG is involved not only with building automation but also power supply systems. The range of services they offer extends to maintenance, servicing and monitoring. eNeG has 60 employees, and its customers include various well-known companies including Jungheinrich AG, Beiersdorf AG, Hamburger Sparkasse as well as MontBlanc Simplo GmbH.

THE QUEST TO FIND A STABLE STANDARD SOLUTION WAS SUCCESSFUL

The Montblanc team was keen to install a standard solution that would be stable and capable of running twenty-four hours a day. Claus-Dieter Brandt already had positive experience with zenon from earlier in his career. He evaluated a number of other solutions too, but ultimately his decision was an easy one to reach. Three buildings – the administrative offices and



two production facilities – are now monitored centrally using zenon. In total these buildings have been fitted with five technical hubs. There are 25 ventilation systems (HVAC systems), two compressed-air systems each with two compressors, two heating systems each with two boilers, and two cooling systems with ten compressors. Each technical hub also includes a heat-recycling system. The company has now been working with zenon since 2002, with the primary focus on operating and observing the technical systems in the buildings. At Montblanc these systems include HVAC, compressed air and extraction systems in the laboratories, heating and hot water supply. To condition the air in the administration building alone Montblanc uses 77 coolers and four external cooling systems.

TREND ANALYSIS IS ESSENTIAL

In total, the systems in the main building include some 2,800 data points, with a further 600 data points in the new Montblanc logistics centre. All these systems are comprehensively visualised in zenon. Any problems or discrepancies

between target values and actual values are logged in zenon, whereby any consequences they may have will become apparent. Claus-Dieter Brandt views the target values and actual values and any differences between them in the form of a graph. This is made possible by the “Extended Trend” module. This module allows historical data (e.g. all the information recorded in the course of a heating cycle) as well as on-line data to be retrieved and viewed in the form of a graph. In this way, those responsible for the building management system can see how the systems are performing, when critical states in the systems occur, and where immediate intervention is required. It is equally important to observe systems over a considerable period of time – ambient conditions such as outdoor temperatures vary and affect the performance of a system.

EASY TO OPERATE

Claus-Dieter Brandt finds zenon very easy to use: when an alarm is selected in the alarms list, a simple click on the “System display” button will automatically open the relevant alarm display. This allows system components to be inspected in detail;

the operator can, for instance, determine which system component is in operation or has triggered a fault message. The cooling and ventilation systems feature an overview display, from which you can move on to the detailed views. Filters, heaters, coolers, fans – detail displays are available as required for each component in a ventilation system. These displays clearly indicate whether valves and sensors, for instance, are operating correctly. Thanks to this comprehensive visualisation, Claus-Dieter Brandt is now able to run and regularly update a complex building management system with just a small team and low overheads. And there are even plans to extend the system: the system manager can easily conceive being able to monitor these systems remotely and to upgrade the alarm management system so that alarms are forwarded to the mobile phones of relevant staff; such systems are already in place at the new Montblanc logistics centre. This ensures that thorough monitoring can be carried out twenty-four hours a day. As old systems are replaced one by one, all the new systems are automatically integrated with the zenon system. This will result in central monitoring, an increased concentration of data, and thus an even more comprehensive flow of information. “All new systems are now linked in with the building management system – zenon will play a part in every single project”, explains Claus-Dieter Brandt with a look of conviction in his eyes. The manager is planning to gradually step up the use of this system. His intention for the future is to store detailed system descriptions as well as dependencies so that in the long term data can be analysed even more specifically and preparation can be carried out for maintenance operations. Likewise, the management team in Hamburg is to be linked up with the new logistics centre in Ellerbek, so that this second site can also be monitored and checked centrally.



Clean heat for Santa Caterina.

There are plenty of winter sports enthusiasts who count Santa Caterina as their favourite resort. Santa Caterina has also hosted more than its share of exciting world-cup skiing. Cold temperatures may be welcomed out on the piste, but whether you’re a casual weekend skier or a top international athlete, you’ll still want to be snug and warm once you’re back indoors: This represents a challenging task for TCVVV AG and its district heating plant in Santa Caterina Valfurva.

The company TCVVV AG was founded in 1997 to produce and distribute clean energy from biomass, and use it for heating and electricity generation. This company builds production facilities, and designs and constructs district heating plants and electricity stations. Managing director Walter Righini: “Our primary objective is to use and add value to local resources; by using renewable energy sources we aim to reduce our dependence on energy from external sources. The municipality of Santa Caterina Valfurva is not connected to the methane gas network, but it does have access to renewable energy sources, in particular wood. This is the main pre-requisite for building a district heating plant fuelled with biomass.”

The district heating plant uses mainly waste products from wood processing, tree surgery and afforestation. Weekly deliveries from local sawmills and other local suppliers guarantee the plant’s supply of renewable energy sources. To protect the environment, the waste gases produced in the combustion process are constantly monitored. The amount of CO₂ produced when the plant is in operation is exactly the same as the amount of CO₂ absorbed by the trees during their life cycle; this is why the district heating plant can justifiably claim to operate on a CO₂-neutral basis.

For control and data acquisition in its district heating plant, TCVVV AG was keen to go specifically with PC-based

technology and an Ethernet network. For safety reasons, redundancy was to be built into the PC network. In the words of the engineer Fabio Pola, who held overall responsibility for all the hardware and software: “We were particularly keen to avoid as far as possible working with conventional PLCs, because redundant hard PLCs are difficult to find and also costly. We were looking for modern, open technology that would allow us to work in a flexible way whilst at the same time reducing our costs.”

DESIGNING A CLEAN ENERGY SUPPLY

COPA-DATA proposed a redundant, integrated solution to TCVVV AG to safely supply the district with heating. The district heating plant in Santa Caterina features a zenon control system that gives the operator central access to all the parameters for the burners. The IEC 61131 compliant straton is already integrated into zenon. This is a soft PLC which is also embedded in a hardware PLC, and it created the link with the controllers. Redundancy can easily be incorporated in both these systems.

The zenon operating system and straton work extremely well together, and this brings the project a number of benefits, especially in terms of speed, data security and cost reductions. zenon and straton run on the same server. They are so closely linked that they even use the same database, which makes configuration considerably simpler, quicker and safer. Variables therefore only need to be created and maintained once.

The server for the TCVVV project is also designed with built-in redundancy, and it will continue to work perfectly even if a module in a computer should malfunction.

Both systems – server and stand-by – are always supplied with the latest data. They also both communicate with the controllers; in other words all the data sent by a PLC arrives simultaneously on both computers. If the control computer fails, then the stand-by machine will take over immediately. As soon as the first server is operational again it will automatically retrieve all the latest data and will resume control, again with no interruption.

INTEGRATED SOLUTION FOR SAFE, ECONOMICAL OPERATION

Different controllers are addressed from the control station, and by using Profinet the existing network structure can continue to be used. As the standard fieldbus, Profibus replaces the inconvenient serial connections and expensive special plugs with Industrial Ethernet. This provides considerably more functions, simpler operation and greater speed. It also spares TCVVV AG the time and expense of special cabling.

straton checks via its Profinet link five Wago 750-340 Profinet devices at a distance of 30 to 40 metres and, as a soft PLC, controls various steam boilers using these fieldbus couplers and retrieves temperature values for archiving in the control system, where they are analysed in trends. Analog signals from the boilers are retrieved and the relevant valves controlled. The cycle time is 100 ms.

However, straton is used not only on the I/O level. Being a versatile tool and an embedded solution, it also carries out important functions in controlling the pressure compensating tank. For safety reasons, the standard requires that a hard PLC should

be installed. Even if the device loses its link with the network, it is essential to ensure that the tank is carefully controlled. The device selected was a Wago 750-860 fieldbus controller in which straton, embedded as a runtime PLC, ensures reliable performance. As an embedded solution, straton is particularly convenient for the end customer as it simply needs to be unpacked and connected. All the configuration modules are created using the straightforward intuitive straton configuration tool with its graphical interface, and variables are linked via a menu or using drag-and-drop techniques. The district heating plant in Santa Caterina benefits above all from the extremely productive integration between straton and zenon. Both straton and zenon can be operated as redundant systems with just a few mouse clicks. Only two PCs are needed to implement a redundant system: all straton projects, just like visualisation running under zenon, will run on a single PC. The second computer is present in a stand-by capacity. This combination of redundant visualisation, soft PLCs and fieldbus I/O produces a highly secure solution that is very easy to configure and can, moreover, be implemented affordably. The straton projects, like the visualisation modules, are configured in the zenon editor. Software engineer Fabio Pola comments: “We found this integrated solution especially effective from the point of view of configuration. Not only do the visualisation module and the PLC share the same database, but the same, familiar editor can also be used to configure different target systems.”

The versatility offered by straton is demonstrated by the way it can operate as a gateway for an ABB gas measuring device. Interestingly, the gas measuring device has only analog outputs

and needs to interface to another control system that monitors the gas concentration and is used for certifying the system. straton therefore uses the Profinet couplers from Wago to read out the values, and then makes them available to the control system via Modbus. In this situation straton is acting as a slave, but it could also act equally well as a master. But another point illustrated by straton and zenon in Santa Caterina is how easily existing systems can be integrated into a project. In parallel with the district biomass heating plant, a collective boiler also had to be integrated with the visualisation and control modules. This “VAS” boiler is controlled with an S7-300 which is linked directly to zenon by using a dedicated S7-TCP driver. The alarm sensor and analog data, for instance, can be evaluated simply without any need to invest in any additional hardware or software.

KNOWING WHAT’S GOING ON

Data produced during ongoing operation is available at all times. It is collected by straton and zenon and archived by zenon. The plant operator alone makes the decision regarding where these archives are stored. If they wish, zenon can even write archives direct to databases, ensuring that no data is lost in the event of system failures. Like on-line data, archived data can also be displayed at any time in the form of an informative trend display:

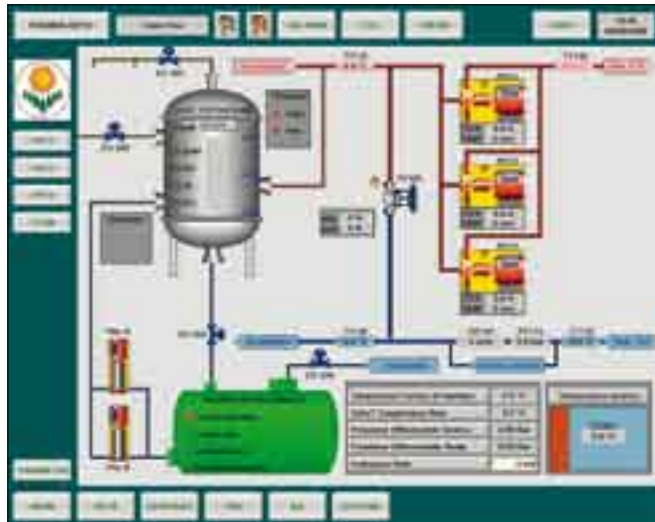
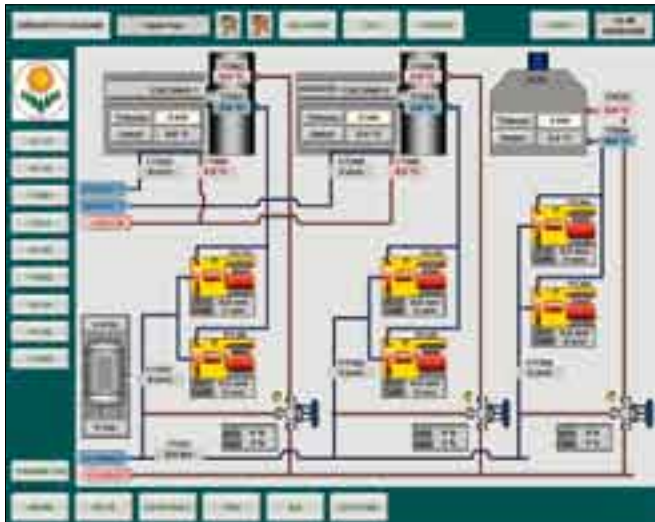
The Extended Trend feature in zenon converts historical and current values into smooth curves. This feature gives full control over curve parameters, axis configuration, zoom factor and much more. Any number of curves can be displayed simultaneously, even if their scaling varies. Since the Extended Trend can display two time axes at the same time in the same chart, it is simple to compare different time periods or batches.

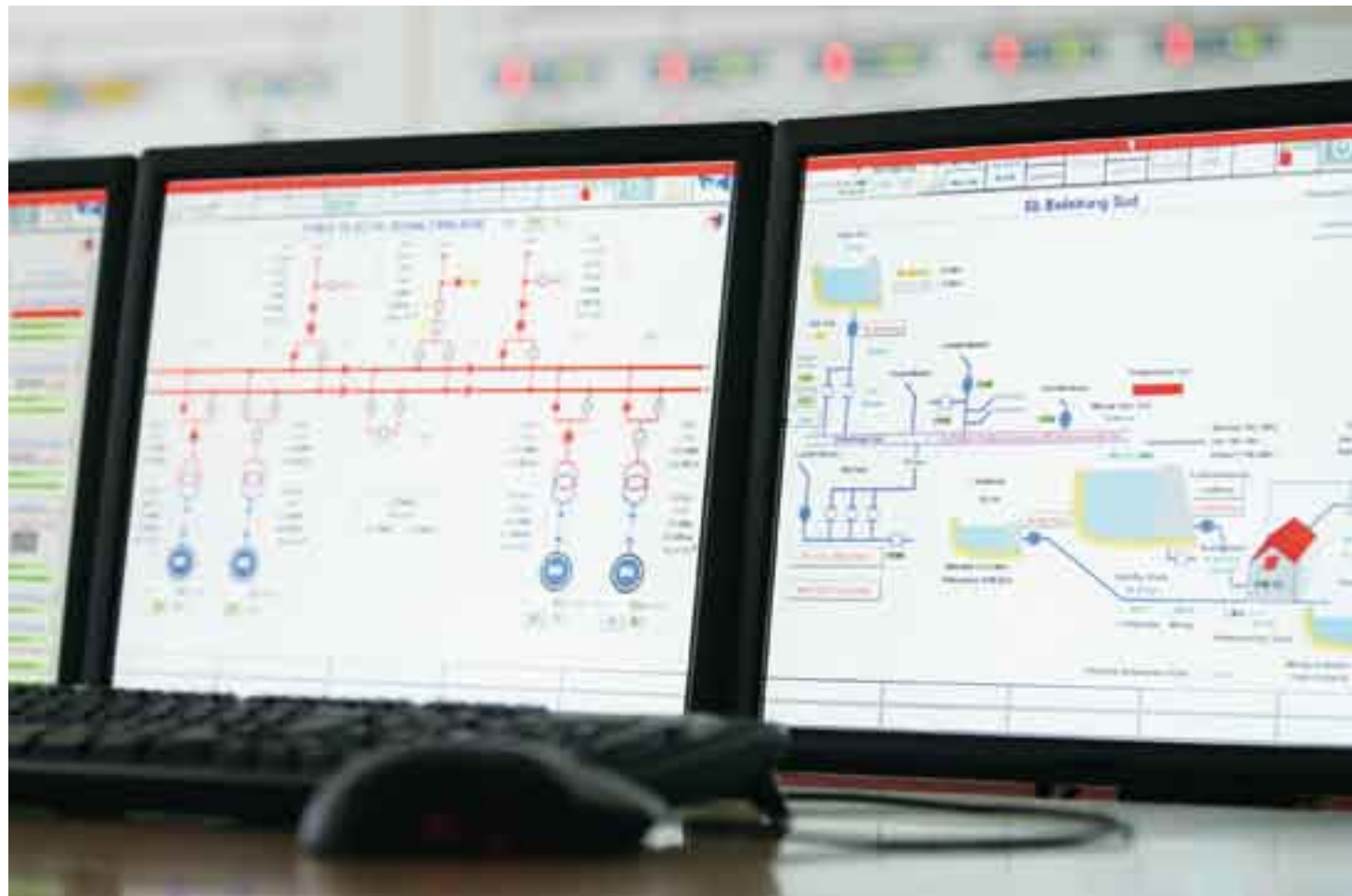
QUICK AND SECURE CONFIGURATION

TCVVV AG succeeded in commissioning its district heating plant within 12 months. It didn’t take long to get zenon configured either. Klaus Rebecchi from COPA-DATA Italia commented: “The TCVVV AG engineers are particularly enthusiastic about the way all the details, including straton, are configured in a single development environment. In other words only one tool is required, and it takes next to no time to learn how to use it.”

This brings down both training and running costs considerably, and at the same time reduces dependence on outside experts. The redundant technology increases operational reliability and ensures that the control system is available at all times.

Software engineer Fabio Pola comments: “zenon and straton have enabled us to make use of innovative and affordable PC-based technologies with our existing Ethernet, and to communicate directly with the PLCs from a PC. This solution has significantly reduced our investment and maintenance costs.”





High tech for ÖBB – power generation.

ÖBB's hydro-electric power plants in Stubachtal have a 210 megawatt rating. The plants produce the main part of ÖBB's electricity supply. Obviously, the control and monitoring of such a plant is laid into competent hands.

Apart from several "museum-wheezes", almost 100 % of all railroads are driven with electrical locomotives. 97 % of the required current is produced by local hydro-electric power plants. ÖBB traditionally draws the current, required for its trains, also from Salzburg's province Pinzgau. Shortly after the beginning for the 20th century, the Kaprunertal-Valley and afterwards also the neighbouring

valleys were analysed by the K&K Railroad Cooperation concerning their suitability for hydro-electric power plants. In 1929 the generating plant Enzingerboden started operation. The gradual extension of the plants Schneiderau and Uttendorf in diverse preliminary reservoirs followed. The reservoirs provide water that is conducted via adits and penstocks to the plants' turbines with generators. Due

to a rating of 210 MW, Stubachtal's plants are able to provide about half of the surge current required by ÖBB. Without own plants this current would have to be purchased; Ing. Wolfgang Steiner, Stubachtal Group's foreman concerning control requisites in the plant domain: "The entire Stubachtal plant group is controlled via SAT 230. This process control system is considered as one of the most innovative products in this field and also provides visualisation." SAT 230 is a modified version of the process control system zenon by COPA-DATA qualified for automation of plants and transformer stations.

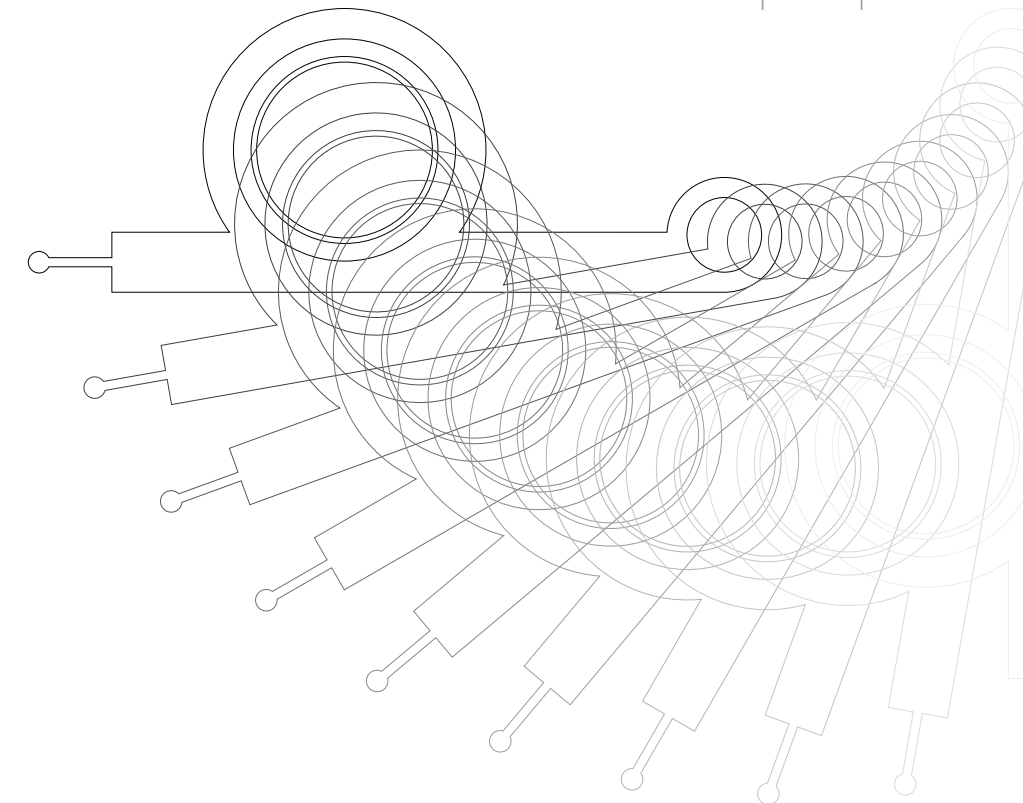
AMAZING POTENTIAL

The following features are offered: control of 110kV-16,7 Hz substations (ÖBB uses current with 16,7 Hz unlike house frequency of 50 Hz), handling of start and shut down action of machines (the best provides a capacity of 33 MW), visualisation of machine sets, water shut systems, turbine controller and voltage

controller, visualisation of power supply units, control of headwater systems (for involvement of reservoirs), control of home requirement systems, security service (gate control, door monitoring), counter logging, as well as message logging and alarming for all.

SMOOTH IMPLEMENTATION

This system has been perfectly installed and implemented by VA TECH SAT together with ÖBB plants' employees. Steinberger: "We transmit high energy quantities via 110 kV main or with power switches and breakers from the transformer station to the consumer (locomotives). Coping this task requires a modern and reliable control system. Therefore the implementation of this new system was necessary. SAT 230 satisfies most modern handling-principles. During the implementation process we were competently supported by VA TECH SAT."



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PROJECT STATUS

Allianz Arena 04/2006 | Andritz 06/2007 | ArcelorMittal
06/2008 | BMW Dingolfing storage and conveyor system 01/2008
| BMW Dingolfing vehicle body construction 12/2007 | BMW
Leipzig GLT 03/2006 | Braun/Gillette 07/2004 | Cawleys 12/2008 |
Clarks 01/2006 | Collini 12/2003 | Converteam 09/2006 |
Ferriere Nord 12/2008 | Ford 09/2006 | Hörmann Logistik
and Modine: 06/2004 | Italcementi 10/2008 | Krones 05/2004
| LaFargePerlmooser 10/2008 | Mabey&Johnson 12/2008 |
Montblanc 01/2008 | ÖBB 11/2003 | Pepsi/QAB 06/2006 |
Sasol 02/2007 | TCVVV 11/2008 | Volkswagen Emden 12/2008

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