# 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
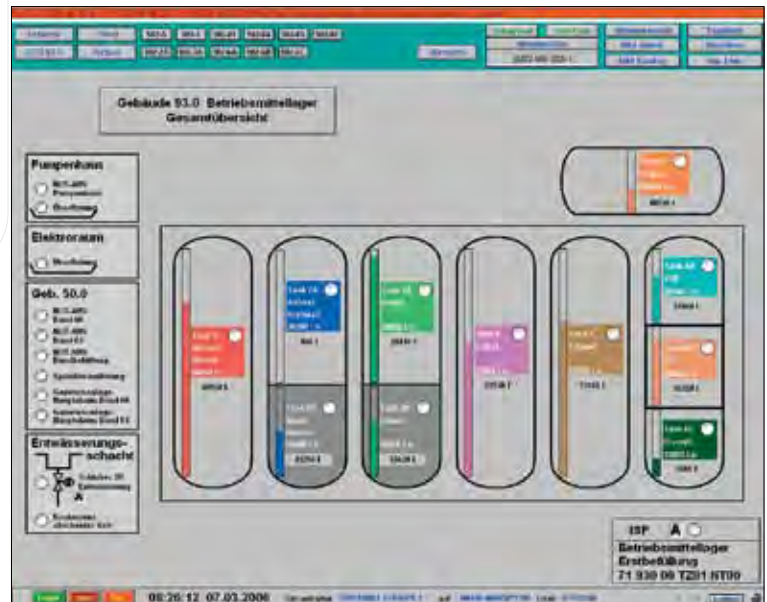
(sensors, actuators and readings) and 70,000 virtual data points from different information sources (data collection points, control cabinet with PLC) of the whole plant and it visualizes operating conditions with over 1,500 facility pictures. With zenon software by COPA-DATA and the project implementation 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.