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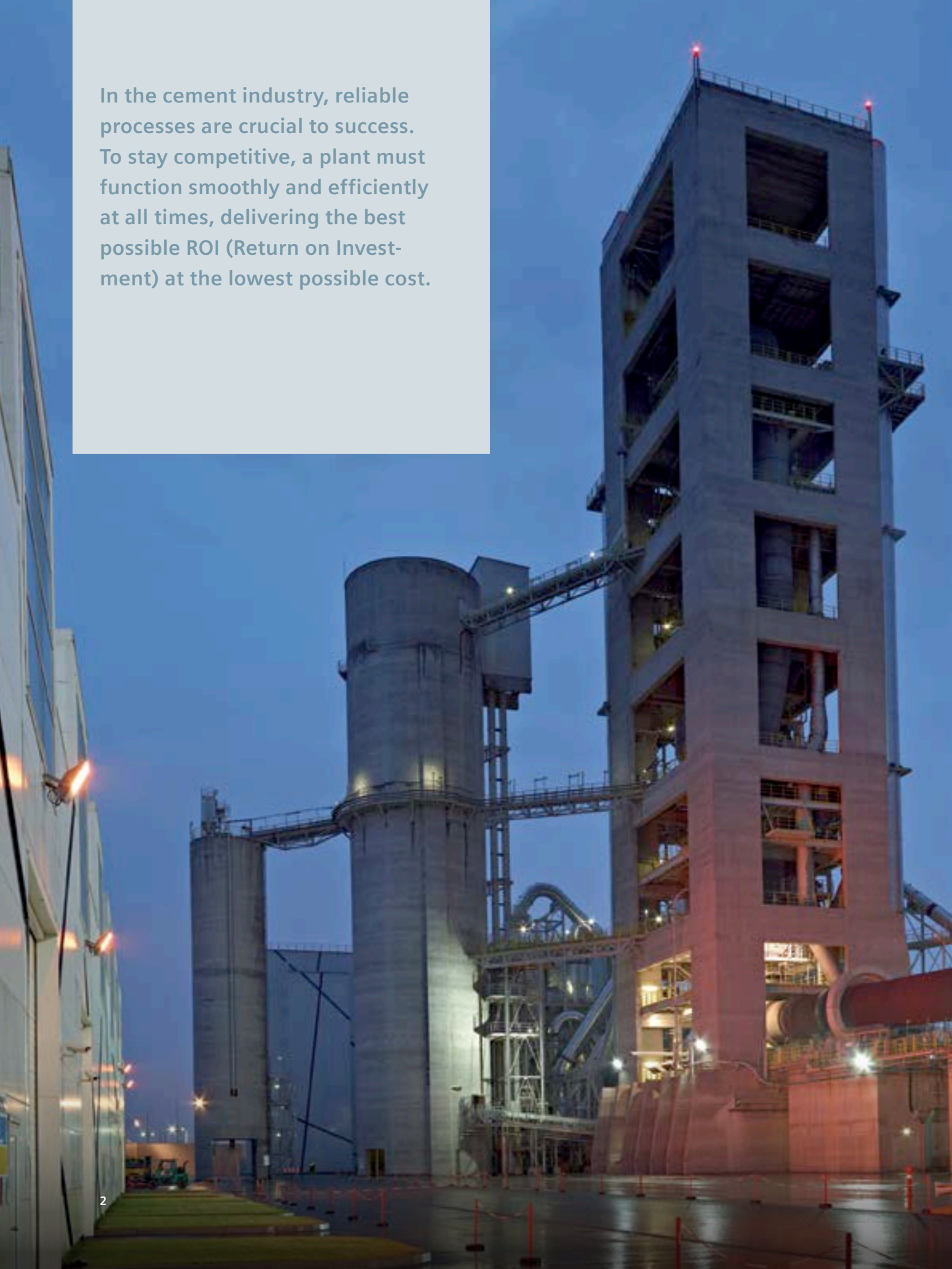
Ingenuity for life

CEMAT

Process Control for the cement industry

[siemens.com/cemat](https://www.siemens.com/cemat)

In the cement industry, reliable processes are crucial to success. To stay competitive, a plant must function smoothly and efficiently at all times, delivering the best possible ROI (Return on Investment) at the lowest possible cost.



CEMAT: The decisive boost to your competitive edge

The leading DCS for the cement industry

With CEMAT, Siemens offers a highly innovative distributed control system (DCS) that helps the cement industry not only stay competitive, but improve competitiveness over the long term – by optimizing productivity, plant availability, and energy efficiency.

CEMAT is much more than just a database with a few cement-specific modules. It contains a complete philosophy on how to operate a cement plant, how to make diagnoses to keep downtimes to a minimum in the event of a plant problem, and how to interconnect the drives, dampers, belt conveyors, and measuring values from the plant with each other. Because these elements have all been preconfigured and proven over many years, engineering is fast and reliable. Also, there is a comprehensive database of cement-specific solutions that eliminates redundant tasks such as creating software and interconnecting that have already been worked out in other plants and scenarios.

Proven and established worldwide

CEMAT is specifically designed for cement plants and has been proven in harsh operating environments over many years of service. Our groundbreaking DCS is well accepted in the cement industry, and the number of users is growing all the time. CEMAT has now been on the market for more than 35 years, and is firmly grounded in our extensive expertise in the field of cement production and the experience of many cement manufacturers worldwide. CEMAT is based on SIMATIC PCS 7, our proven distributed control system, and offers a unique open architecture for modern, future-proof, and economical solutions for the cement industry. It makes use of all features and functions of SIMATIC PCS 7 and adds additional industry-specific functionality. In addition to the standard languages of SIMATIC PCS 7 (English, German, French, Italian, and Spanish), Chinese and Russian are also available for the operator interface. If a different language is required, a translation tool will assist you in adapting the screens.

Designed with the future in mind

Because the life cycle of a cement plant is much longer than the service life of a single version of a control system, it is essential that the strategy behind the development of a control system remains innovative. CEMAT is designed for the future to guarantee compatibility with ongoing innovations. The latest version is even compatible with all previous versions dating back to version 1.8, which was released in 1978. This means that older PLC programs can either be operated and visualized on the latest version of the operating system or upgraded to the current and later versions without difficulty. This saves you money when investing in new plant equipment or during system upgrades.

Minerals Automation Standard

The new Version of CEMAT also covers the Minerals Automation Standard, which is designed for the needs of the mining industry.

Developed in close cooperation with leading cement manufacturers worldwide, CEMAT delivers everything necessary to seamlessly meet the most relevant demands of the industry: productivity, plant availability, and energy efficiency.



Designed to meet the key demands of the cement industry

More productivity

CEMAT ensures a significant boost in productivity throughout the entire life cycle of your plant. In the production phase, self-descriptive standard faceplates guarantee easy handling for the operator. Detailed fault indication with high performance plausibility logic ensures fast fault location for minimized downtimes. The SIMATIC PCS 7 Asset Management function and the CEMAT Maintenance information allow the realization of innovative maintenance strategies. The complete process can be operated and monitored via Internet/ Intranet. With CEMAT, you can be sure that there will be no unreasonable start-up of drives or groups because of detailed status reports prior to all starts.

Faster engineering

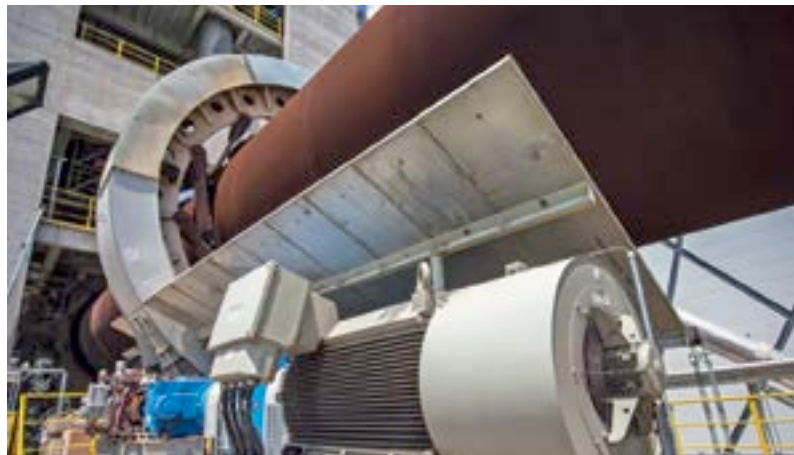
Predefined modules ensure simple and fast engineering, and rigorous guidance of the engineer during the programming process avoids patchworking of the software. And thanks to standard interfaces between the CEMAT modules, there is also a very low probability of programming errors. With CEMAT, you profit from proven software that has been designed for the specific requirements in your industry. The high quality of the user software ensures fast commissioning.

Higher availability

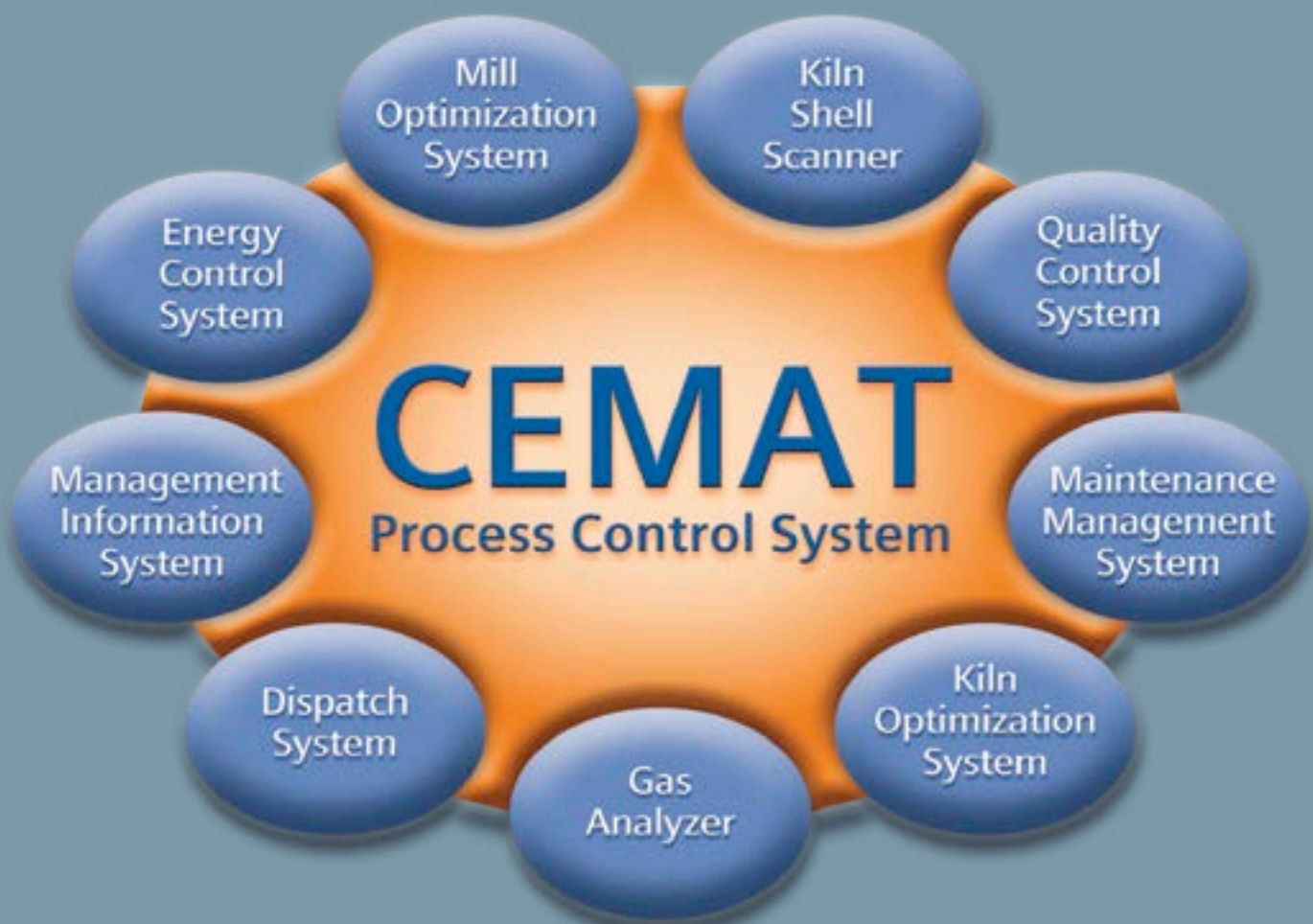
The availability of your equipment can be increased with preventive maintenance. Condition monitoring functions can be easily integrated and displayed. Standard faceplates are available for several drive applications, including MultipleDrive and SIPLUS Condition Monitoring System. Increased plant performance, reduced downtime, and cost savings can be achieved by installing condition monitoring systems. Integration of this functionality into the process control system makes plant-wide information available and documents the status of all equipment. One of the features of SIMATIC PCS 7 is the Asset Management. This optional package allows you to easily realize and optimally implement innovative maintenance strategies. Detailed diagnostics of all process control components reduces downtimes in the case of problems or other events and minimizes production losses.

Highest plant efficiency

The latest version of CEMAT offers you multiple innovative functions designed to provide higher plant availability and productivity – for example, enhanced signaling and diagnostic functions reduce plant downtimes as well as operating and maintenance costs.



Technological modules such as a mill and kiln optimization system, a kiln shell scanner, or a quality control system can easily be integrated into CEMAT and can be managed from the CEMAT Operator console, too. Standard interfaces are available to enable communication with Siemens SIMATIC IT or packages from system integrators.



Integration of technological modules – for even more effective production

Advantages at a glance

- Small initial investment and low lifecycle costs
- State-of-the-art technology lasts well into the future
- Increased output, assured quality, reduced energy consumption and pollution
- Data transparency up to the management level in real time
- No expensive external programming specialists required
- Full transfer of technical knowledge
- Continual supplier support not necessary
- High quality and efficiency through user software
- High system availability on a consistent basis
- Diagnostic functions for fast fault localization

Reducing downtime

Clear and detailed indication of faults, warnings and interlocking conditions are available for any plant object and allows the operator to react quickly to potential errors.

Creating significant and clear fault messages

Alarm messages are only created for “active” alarm sections and suppressed if not significant, as for example in local mode or in case of a power supply failure.

Logging all operations

All operator actions depend on authorizations and are logged in the message system.

Avoiding trial starts

Group status call displays faults, warnings and interlocks also prior to start.

Finding bypassed/simulated signals

Indication of simulations within a group or for the complete PLC.

Informing control room and management personnel

Operators and shift manager can identify faults rapidly and coordinate repairs and starting sequences.

Providing information for all plant objects

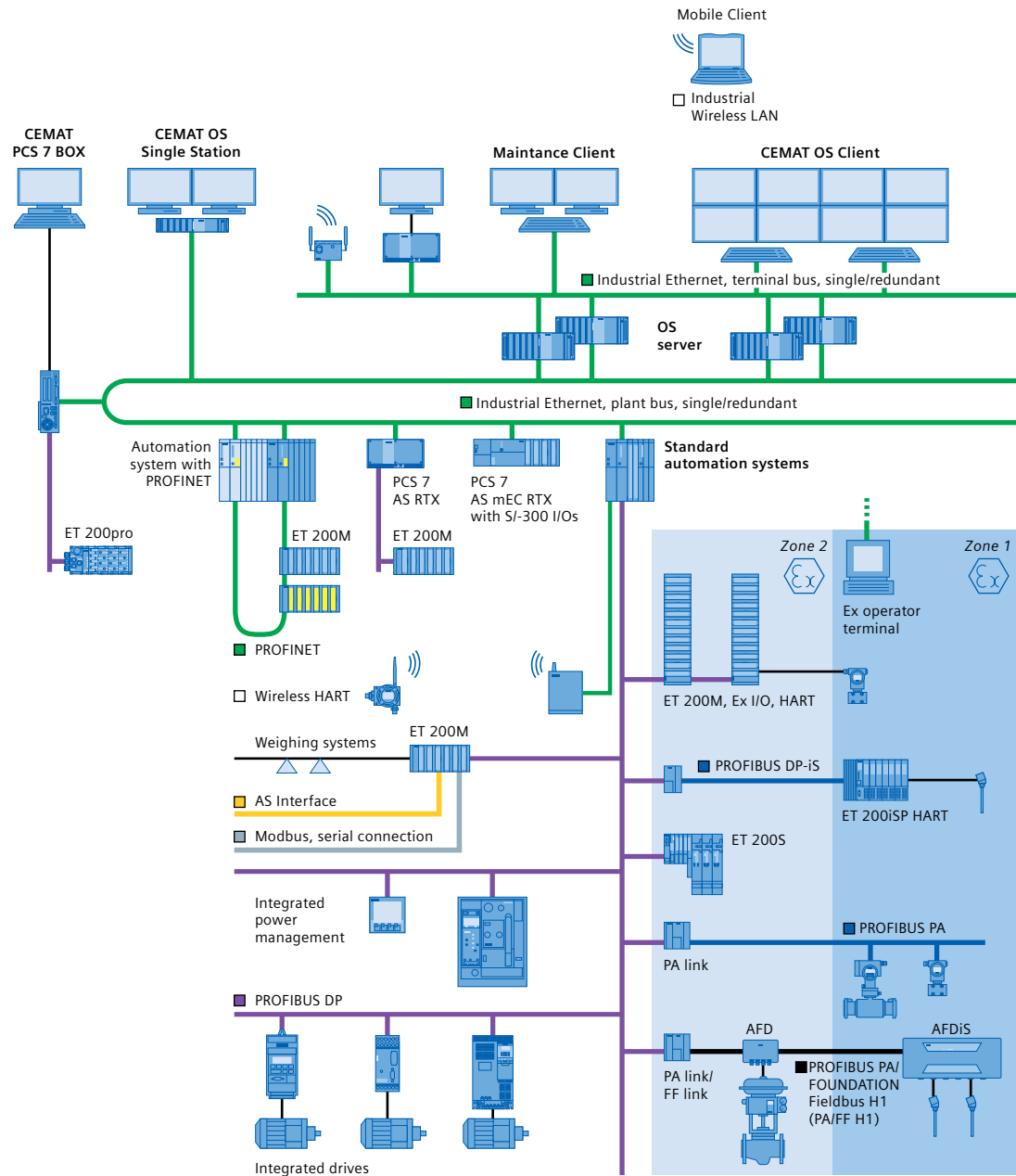
Location information, I/O information as well as additional documents such as panel or MCC drawings, operation descriptions can be linked to the plant object and are accessible online on the operation station.

Fault analysis and statistics

Via maintenance, dialog weak points can be analyzed and eliminated.

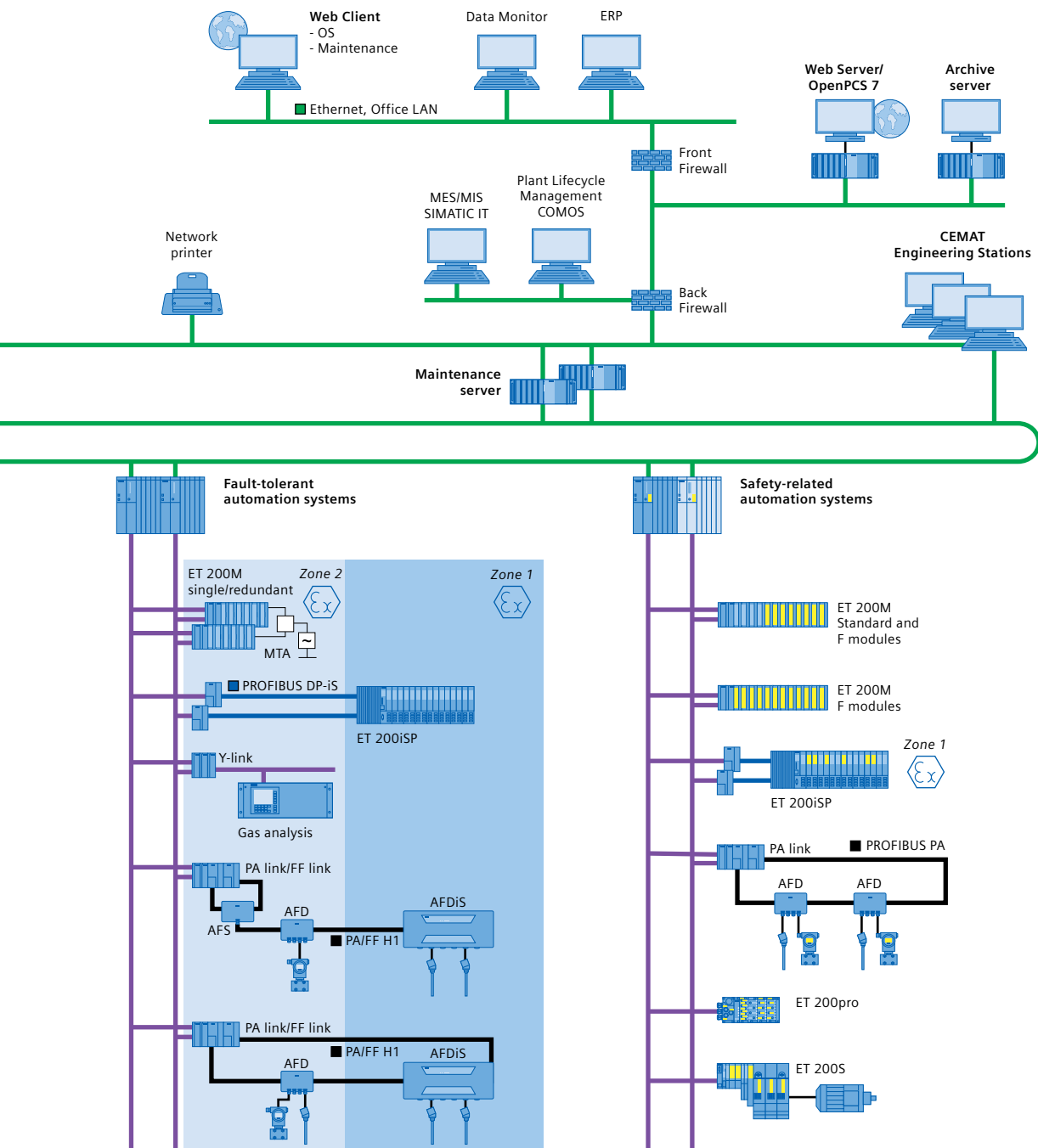


Graphic system architecture



The entire hardware structure of the process control system is hierarchically displayed at the maintenance station.

The automatic generation of hierarchical diagnostic images reduces both engineering and maintenance costs when, for example, changes need to be made in the plant.



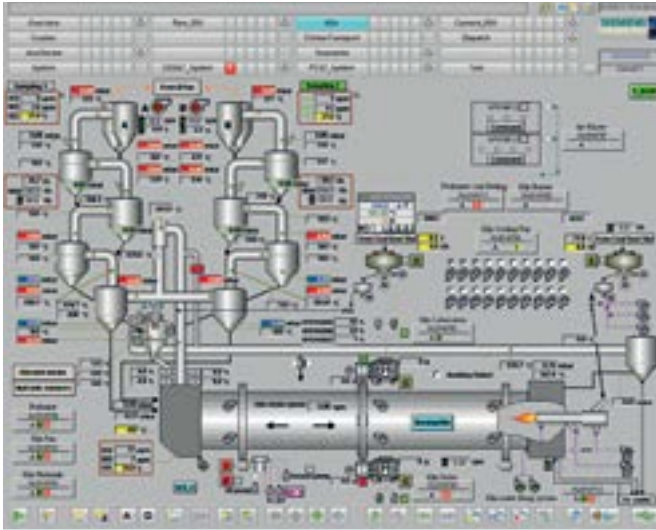
With SIMATIC PCS 7 and CEMAT, all components that can be diagnosed – like the PCs, bus components, automation systems, and the entire decentralized periphery such as I/O modules and intelligent field devices – are integrated with Asset Management.

As a result, all process control components of the plant can be monitored online and in real time, allowing the evaluation of their current status.

CEMAT expands SIMATIC PCS 7 into a process control system capable of meeting all the needs of the cement industry. CEMAT makes use of all features of SIMATIC PCS 7 and adds the functionalities of plant operation and fault diagnosis. Special function blocks and faceplates are designed to manage all the kinds of operation, interlocking, and supervision functions that are typically required in cement plants. The functions are preconfigured and proven over many years in use. This makes engineering easy, fast, and reliable. Without sacrificing any of the features that users have learned to appreciate in previous CEMAT versions, the latest version comes with new features and the latest technology.



Tailored to your specific needs



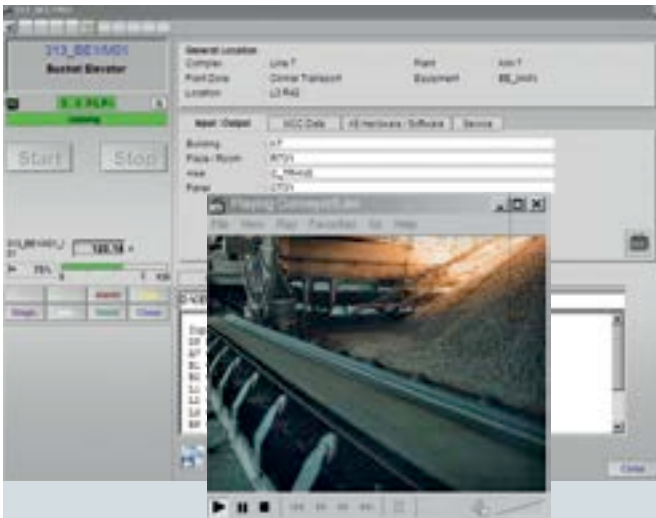
Features and functions for advanced, integrated automation

CEMAT offers many unique features that make the operation of a cement plant simpler and more efficient: In the process display, each element is represented by a block icon that shows the status, the operating mode, the plant identifier, and the most important values.



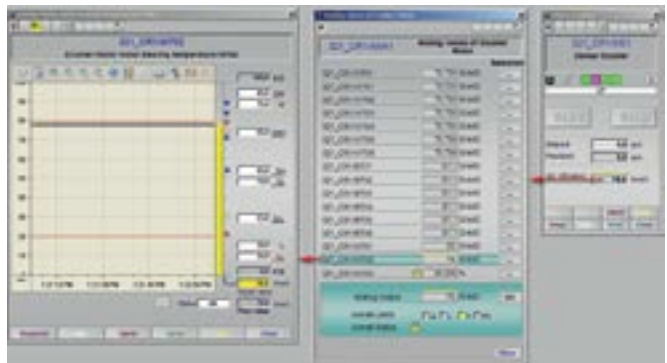
Diagnosis Dialog

The diagnosis dialog shows the inputs and outputs of the block, including status information, interlocking conditions, and faults. It also permits the modification of process parameters. The interlocking condition encompasses the signal status and the capability for a "block jump." This means that the faceplate of the connected block can be opened directly by a click on the interface. Signals and signals states can be tracked across block boundaries, which allows the operator to react quickly to potential errors.




Information Dialog

The information dialog provides additional information about hardware installation location, I/O addresses, MCC data, operator notes and object-related messages. An open user interface within the information dialog offers access to sound files, videos, PDF descriptions, and CAD drawings.



Operator Faceplate

The Operator Faceplate shows more detailed information, such as comments, fault status, operator permission, operating conditions, and simulations, and it provides buttons to allow the operation of the equipment (Start, Stop, Selection, Set Point, etc). Invocation buttons open secondary dialogs that provide additional information.

A low-angle, upward-looking photograph of a massive industrial plant, likely a refinery or chemical processing facility. The image is dominated by a dense network of silver-colored metal pipes, structural steel beams, and walkways. A large, curved pipe arches across the upper right portion of the frame. In the center, a vertical cylindrical vessel is visible, surrounded by a complex web of support structures. The sky is a clear, pale blue. The overall impression is one of scale and complexity.

Drives can be started and stopped in automatic mode via the group module, in single-start mode (individually), or in local mode via a local switch in the field. Different options are available and allow easy adaptations to the customer's requirements in the field.

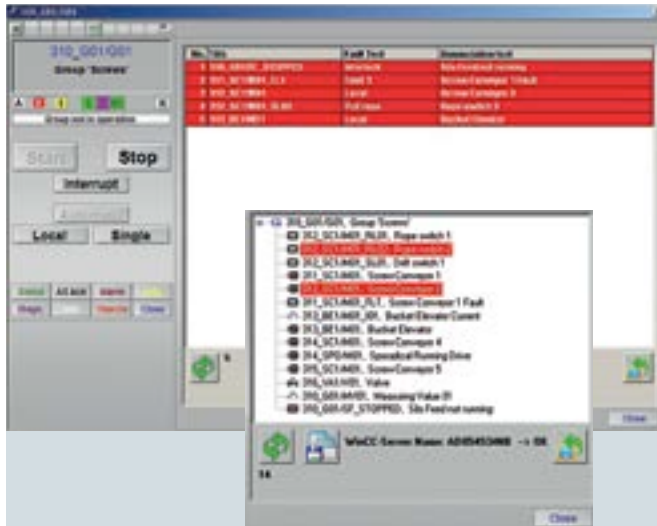
Group Module

The group module is a superordinated module for starting and stopping and for monitoring technologically grouped plant sections. The group module enables the visualization of the operational conditions of a plant section displayed as a status display, and a summarizing indication for faults, warnings, and interlocks.

Route Module

The route module is a module for the selection of transport directions within a group. The route module allows the visualization of the operational conditions of a transport direction within a plant section, displayed as a status display and a summarizing indication for faults, warnings, and interlocks.

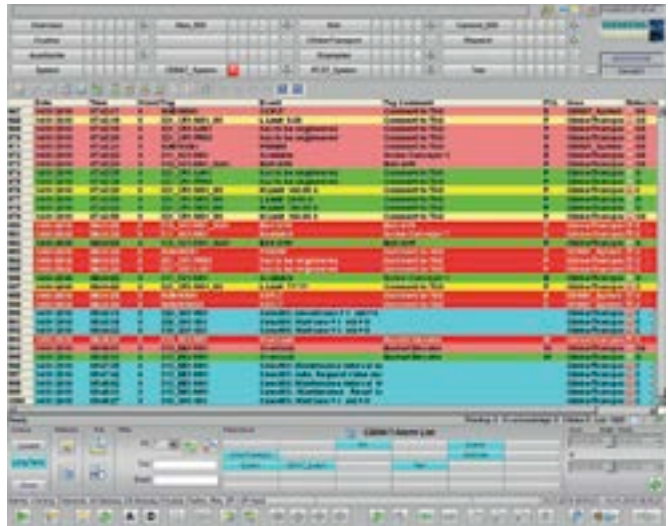
Group and Route Modules



Group and route provide additional diagnostic functions

- The status call of the group and routes can be used to list all existing faults, warnings, or interlocking conditions of the drives, measuring values, and process signals assigned to this group or route, even if this group/route is not active.
- The object list shows all elements linked to the group, including operating status and indication of simulation/bypass.
- The highlight function marks all objects belonging to a group or route.
- The group faceplate can be opened directly via the related objects.

Process signals can be simulated, for example, during commissioning. In order to detect the simulations in the system, a function is provided to list all simulations of bypassed process signals within the AS.

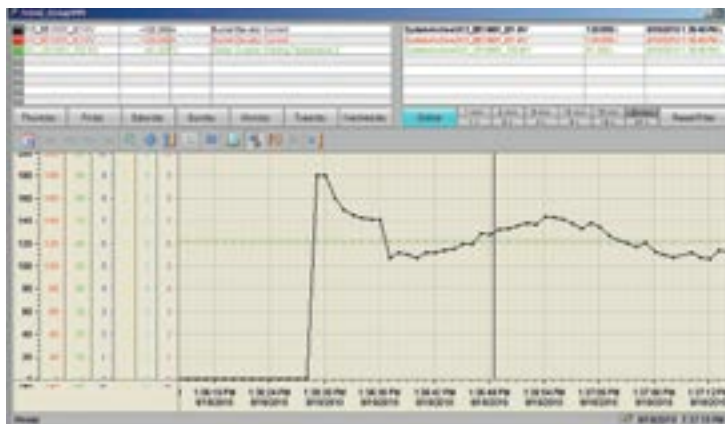


Message System

In the CEMAT message system, each message contains the following information:

- Incoming date/time
- Plant identifier
- Fault type
- Message text (block comment)
- Fault class (P = process, E = electrical, M = mechanical, S = safety emergency off)

The alarm dialog shows all messages created by the specific object (events and operations).



Trend Control

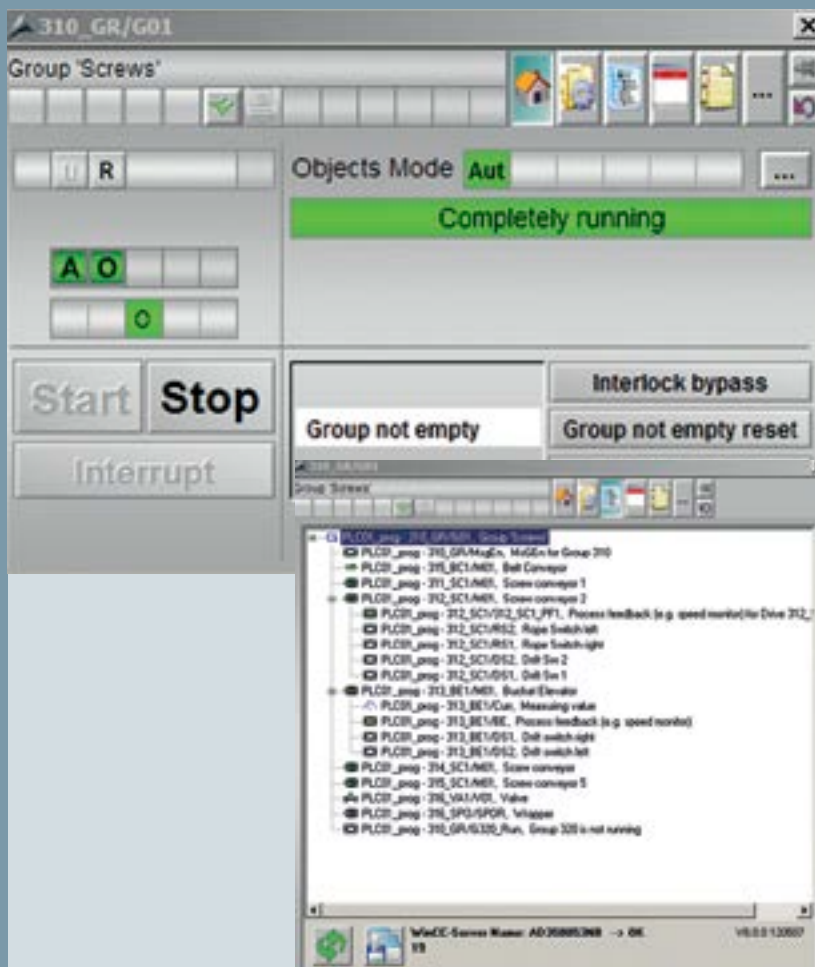
Alarms can be filtered for fault type, plant identifier, fault class, section, and time, or, for example, exported in order to better analyze critical plant states. CEMAT trend controls allow the online configuration of trend windows, including selection of facility for day of the week and time range. Web client diagnostic information via Web server enables easy maintenance data transmission via LAN, SMS and e-mail.

CEMAT breaks new ground in every way, and offers new opportunities in cement production because its technology is based on SIMATIC PCS 7 and integrates the latest technologies as well as consolidated functions from other different project standards.

New CEMAT functions

In typical PCS7 APL (Advanced Process Library) look & feel, CEMAT now presents additional functionalities such as:

- Object list on drive level and two level object list on Group- and Route module
- Additional manual modes and Out-of-Service mode
- Use of feature- and permission word
- Overall Group/ Drive communication (also from PLC to PLC)
- Enhanced online curve selection
- Power management interface
- PLC related object browser with selectable search criteria (i.e. "show all devices which are in Out-of-service mode", ...)
- Calibration for dampers and position simulation for valves
- Emergency Stop function direct on the symbols
- Panel interface

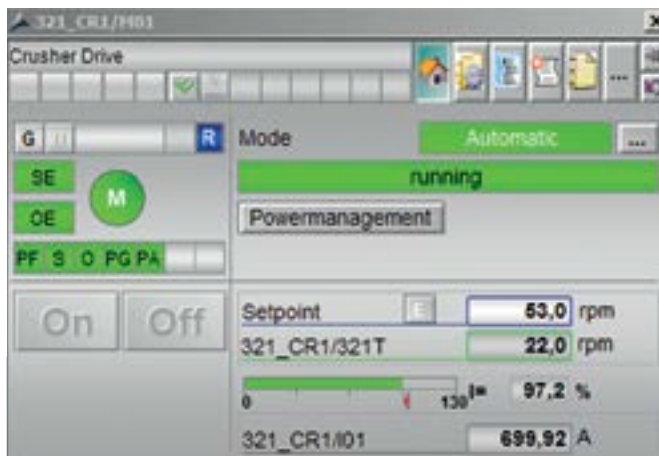


Group module with Object List

The Group module is used to operate (start, stop, etc.) an entire group of devices (i.e. drives, dampers, ...). In addition, a summary of the linked objects' state is displayed in the Group module, so that plant personnel always have all required information at a glance.

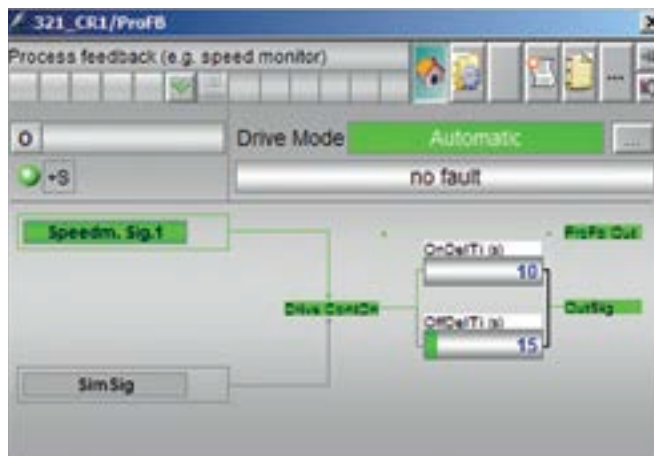
When opening the object list the modules of a group are displayed with their actual status (i.e. "running", "off", "faulty", etc.). The objects can be sorted according to their startup sequence. If, for example, a module does not start as expected, the operator can open the faceplate of the object in question to obtain more detailed information about interlocks, faults, etc.

Enhanced functionalities



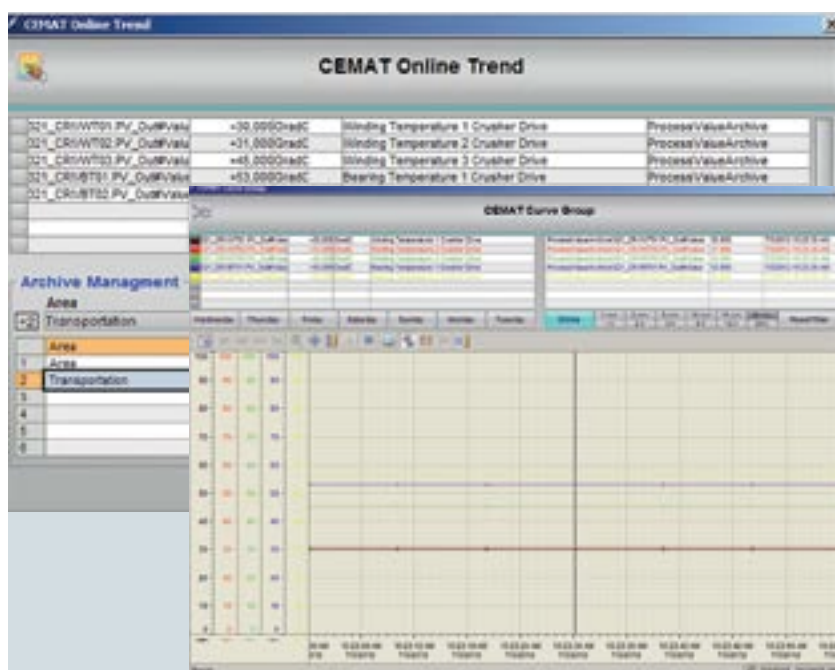
Drive Faceplate with APL look & feel

Apart from the module status (such as "off", "started", "faulty", ...) the drive faceplate also shows all information about the actual operating mode (i.e. automatic, manual, ...), the status of the interlocks as well as a set-point for VSDs (Variable speed drive). It also holds the links to any related measurements assigned to the drive, such as power consumption, bearing temperatures, vibration etc. The faceplate also gives direct access to a list of the drive's alarms, other windows show drive related notes, maintenance or service and diagnosis information.



Process feedback module

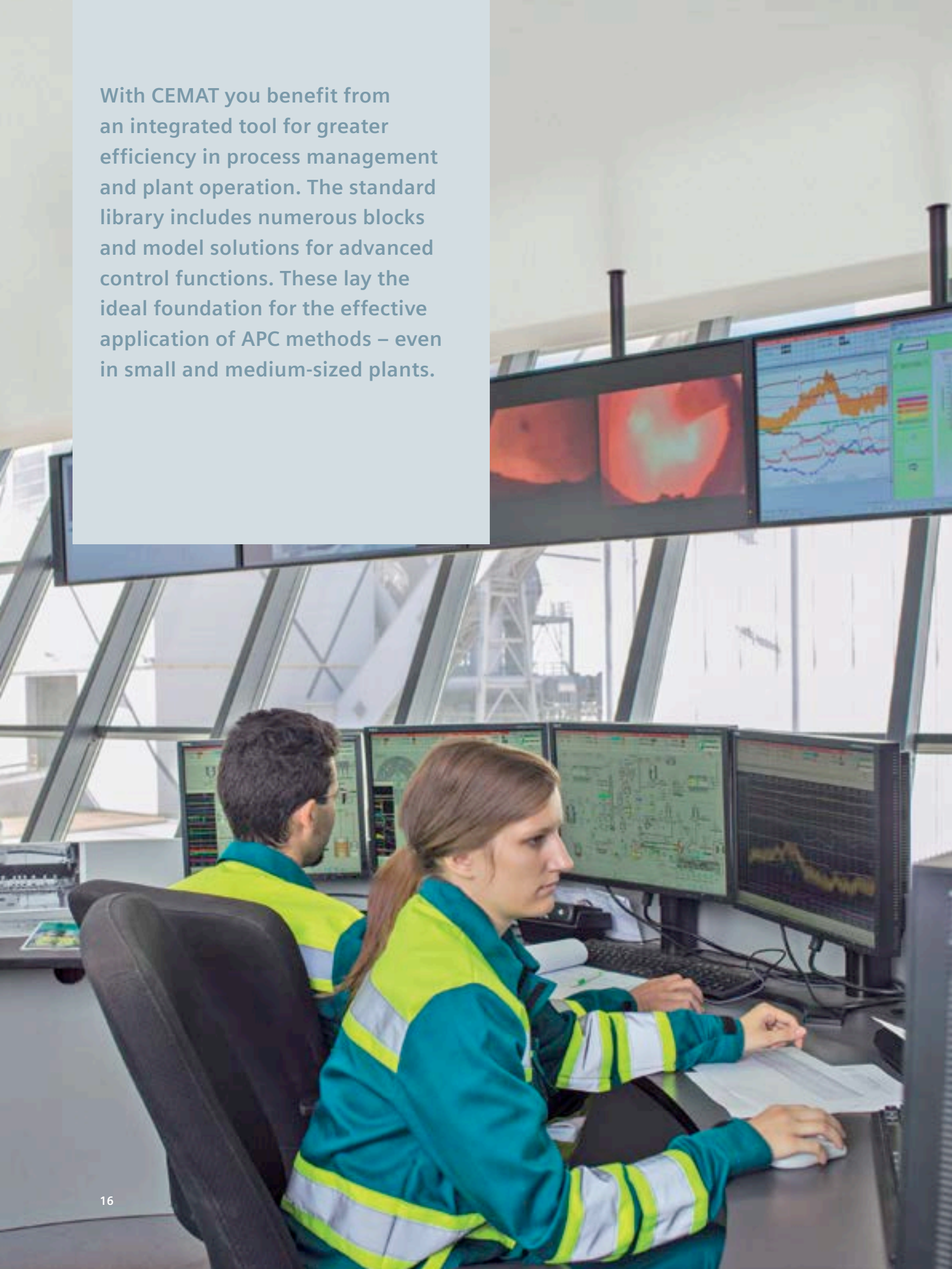
This feature can monitor binary or analog process feedback signals of a drive, such as speed monitor or pressure signals. Depending on the block configuration, the input may either be evaluated during drive start only, or when the drive is stopped, too. The detailed timings while starting are dynamically displayed.



Online grouping of curves

With the new CEMAT trend display, curves can be grouped online into a trend window by simply clicking on the measurement icon.

With CEMAT you benefit from an integrated tool for greater efficiency in process management and plant operation. The standard library includes numerous blocks and model solutions for advanced control functions. These lay the ideal foundation for the effective application of APC methods – even in small and medium-sized plants.



Intelligent process optimization with APC Advanced Process Control

Simple, economical, ready to use

Thanks to Advanced Process Control, even complex situations can be mathematically described with process parameters or variables – and used for automatic, flexible plant operation. APC provides process management that can significantly reduce the consumption of energy, consistently maintain high quality standards, and contribute to more flexible production.

With CEMAT, even the most advanced APC applications can be easily and cost-effectively implemented: the standard library contains numerous high-level controls for APC functions that manage a large portion of the sophisticated control tasks used in the process industry. With model-based predictive control (MPC), processes like the grinding mill can be optimized.

Operating and monitoring the process easily via Internet/Intranet

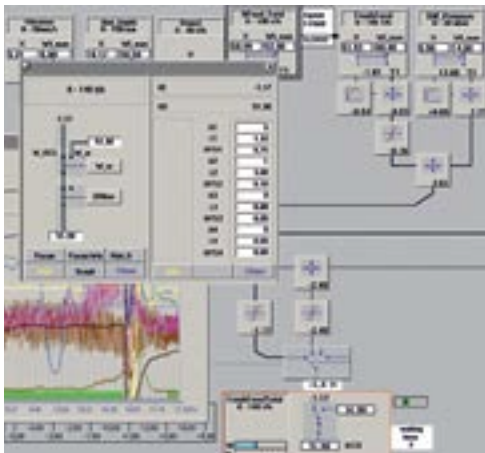
With SIMATIC PCS 7 Web, you can control the entire process via Internet/Intranet from any commonly available PC using Internet Explorer. The system automatically converts the selected images, and thus requires only minimal engineering effort.

Safe, worldwide access via the Web

User-specific passwords, firewalls, and individual application concepts protect the system from unauthorized interventions. Up to 50 PCS 7 Web clients can simultaneously access a SIMATIC PCS 7 OS Web server, enabling remote control from diverse locations.

Increased Plant Efficiency

- Standard deviations are minimized – and can be adjusted more quickly if required
- Throughput is significantly increased (typically by 1–5 percent) – with consistent product quality
- Energy consumption is substantially reduced (typically by 3–10 percent) – as is the use of raw materials
- Manual interventions will be significantly reduced – which leads to a reduction in operator stress
- Transitions between different operating points are optimized, which means faster operating point changes and less non-production time
- The lifetime of the plant with its existing automation increases – with less maintenance work
- Process understanding is improved due to modeling and prediction



As a partner to industry, we also have energy efficiency in our sights. We offer competent advice and goal-oriented solutions to help the cement industry reduce its energy costs and minimize pollutant emissions so that the production process becomes just as energy-efficient and environmentally acceptable as the end product itself.



Energy efficiency

Power Management

CEMAT enables processes to be continually optimized, that includes the use of energy. A typical example is the combustion process in rotary kilns. Already integrated in our innovative DCS: Intelligent Power Management, which determines exactly how much energy each unit is using and so reveals the “energy wasters” that can be replaced by more efficient systems. Another important function is monitoring energy imports, and staying within contractual limits by, for example, selectively switching off defined parts of the plant.

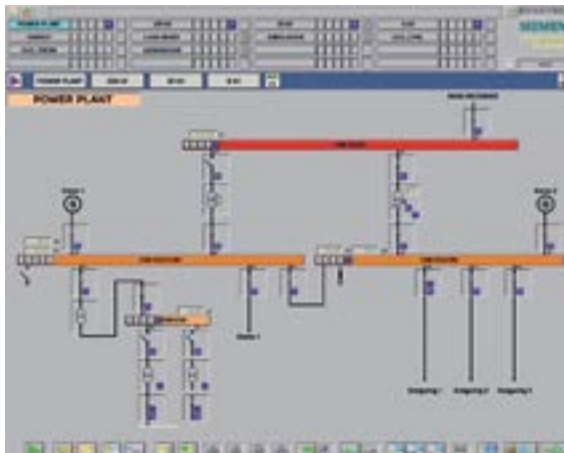
Waste Heat Recovery

Together with other well-known plant constructors, we assist the cement industry with the planning and construction of innovative heat recovery plants that pay for themselves in a very short time.

We also contribute to optimizing the operation of your plant by supplying the right measuring and automation equipment. The cement plant and power plant are monitored and controlled from a common control room by the SIMATIC PCS 7 process control system, without the need for additional operating personnel. This provides integrated automation throughout the entire plant.

Process Optimisation/Fuel Manager

For cement plants using several alternative fuels, the CEMAT system can be extended to manage different fuels with different calorific values. With a fuel manager, the kiln gets always the right amount of energy necessary for the burning process. This helps avoid overheating of the kiln and dramatically reduces operation costs. CEMAT includes several function blocks that enable the process engineer to optimize the clinker burning process as well as the grinding process. With stable and optimized processes, the entire cement plant will become much more efficient.



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