SIEMENS

Minerals Automation Standard

The Process Control System for the mining industry

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Answers for Industry.

Globalization, environmental protection, rising cost pressure and growing complexity – the enormous challenges faced by today's mining enterprises call for new integrated and innovative solutions that combine productivity and efficiency.

The Minerals Automation Standard is Siemens' answer to support the mining industry in managing its challenges.



The decisive boost to your competitive edge

Mining operations face several challenges

The decisive challenges for economic production under continuing price pressure in the mining industry are:

Increase through-put at highest availability and reliability across all mining operations. This requires overall process optimization, improved efficiency and recovery especially in the beneficiation process area.

Increase product quality, e.g. through higher quality separation

Minimize lifecycle costs through lower maintenance costs, minimized wear and tear, and comprehensive support

Protect personnel, machinery and environment in continuous system operation

Increase environmental sustainability in compliance with regulations for environmental protection and minimizing energy and water consumption

Respond swiftly to constantly changing market requirements

Siemens Minerals Automation Standard

- Was designed for the special requirements of the minerals industry
- Is based on many years of experience in minerals
- Uses approved systems and methods

Minerals Automation Standard is more than just a library with a few minerals-specific modules. With Minerals Automation Standard, Siemens enables operators to face challenges of the mining industry.



Minerals Automation Standard represents a complete philosophy on how to operate a mining plant, how to make diagnoses to keep downtimes to a minimum in the event of a plant problem and how to interconnect drives, MCC's, power devices and process instrumentations from the plant.

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A complete philosophy for mining success

Minerals Automation Standard is a complete philosophy on:

How to operate a mining process

Easy handling for the operator:

- Self-explanatory standard interfaces for fast and easy operation and monitoring
- Visualization of process information according to predefined process hierarchy and structure
- Starting/Stopping of complete process groups with one mouse-click only
- Highly sophisticated and easy route selection
- Specific user-access and rights management for operator/group with custom authorization to ensure safe operation and security

How to realize fault diagnosis in a mining process

- Easy fault-finding reduces downtimes
- Thanks to highly sophisticated plausibility logic, only one message per alarm condition is generated
- Detailed information on hardware fault locations
- Concise and clear messages, distinguishing types of faults, and containing as much detail as possible

How to engineer a mining process

- Library of software modules for all kind of functions in the mining industry
- Guided engineering process to achieve highest software quality with configuration approach – no programming necessary
- Standard interfaces between software modules to minimize errors
- Integrated simulation features to ease system test
- Integrated Advanced process library for all process optimization tasks
- Open Interfaces for integration of third party devices
- Easy bulk engineering and data transfer from process engineering tools



With Minerals Automation Standard Siemens set a new Standard in Mining Operations. The basis is Siemens CEMAT, the market leader for process control in the cement industry, with a success story of more the 35 years. The minerals standard combines the proven CEMAT advantages with Siemens' experience in mining, enriched by functions especially developed for the requirements of the mining industry.

Mining experiences and requirements

More than 35 years of CEMAT

The distributed control system (DCS) for the Mining Industry

Minerals Automation Standard combines the proven CEMAT advantages with Siemens' experience in mining, enriched by functions especially developed for the requirements of the mining industry. Another plus is the innovative Advanced Process Library look & feel of SIMATIC PCS 7 applied in this new standard.

The Minerals Automation Standard provides a comprehensive Library of mining-specific optimizations to leverage efficiency and quality for operation and engineering in the mining industry. SIMATIC PCS 7 is not only an established process control system for Minerals Automation Standard; with its modern architecture it also offers the ideal basis for future-proof and economical solutions in the mining industry.

Key functions and features

The Minerals Automation Standard is based on these features and functionalities:

- Function block libraries for optimized engineering and operation specially tailored to the requirements the mining industry
- Highest availability and redundancy on all levels whenever required
- Scalable from single equipment to complete mine operation
- Central engineering system for efficient engineering
- Easy integration of motors & drives based on open communication standards
- Uniform integration of FOUNDATION Fieldbus and PROFIBUS PA
- Advanced Alarm system with mining-specific service functions
- Diagnostic system for fast recognition of faults and reduction of downtimes
- Integrated Asset Management for electronic and mechanical components

The Mining Process Control system

- An Integrated automation and management solution with highest level of integration between DCS, Safety, PLC and networks
- Less and simplified engineering work for the entire automation project
- Simple and flexible control of the process through ergonomic, process-oriented operation and monitoring

Minerals Automation Standard / CEMAT V8.0

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 Minerals Automation Standard, 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. Minerals Automation Standard has been designed to answer the key automation demands of the mining industry and to allow for best performance and highest availability whenever required, most efficient operation, the largest variety of configuration options and the seamless integration at lowest automation lifecycle costs. In combination with the most powerful engineering tools, it optimizes competitiveness on all levels of an operation.

Designed to keep an enterprise ahead of competition

Highest availability and redundancy concept

Minerals Automation Standard offers highest availability based on extreme reliable components and full redundancy on all automation levels, whenever required.

An open system based on industrial standards

Seamless integration of any equipment like drives, MCC's, CCTV and IT systems is supported by an open system architecture, providing industrial standards like OPC, Ethernet, Industrial WLAN, MODBUS, PROFINET and Web Access.

IT security

With its pioneering security concept, Minerals Automation Standard offers comprehensive solutions for protecting a mining operation. These are based on a staggered security architecture and form a key element to ensure reliable process operation.

Central Engineering system

The Central Engineering system enables highly-efficient system-wide engineering and management of all DCS components in any lifecycle phase.

Advanced Engineering system

AdvancedES bridges the gap between planning tools for mechanical and electrical plant engineering and detailed engineering for the process control. Thus it paves the way to an integrated plant lifecycle management.

Process Device Manager

Simatic PDM offers easy integration of intelligent field devices and provides device management with central parameterization, diagnostics and loop-check.

Plant Asset Management

This provides an integrated asset management with automatic asset information generation based on the process hierarchy and the automatic feedback of intelligent devices. In addition, asset information of mechanical equipment can be easily integrated.

Process Historian & Information server

The fully integrated long-term archive system provides scalable and centralized storage of production and performance process data from multiple projects in real time, supplying, amongst others, the foundation for plant asset management activities.

One system for process and power control

Integrated Power Control for mine operations based on the IEC 61850 communication standard combines process and power control on one platform. This approach results in cost savings and increased availability over the entire lifecycle.

Energy Management

"PROFlenergy" products support saving energy and enable fast and standardized implementation. Energy management solutions provide highest transparency of energy data through a library-based energy dashboard: They also help to reduce energy costs by KPI alarming and in-time reaction, from data acquisition up to enterprise forecast and planning level.

APC

Advanced process library helps to implement APC (Advanced Process Control) applications easily and cost-efficiently with the full advantages of an integrated solution of the same look and feel for the operators. APC covers different process control methods on a higher control level and includes for example model predictive control, soft sensors, neuronal networks, fuzzy control and more.

Minerals Automation Standard expands SIMATIC PCS 7 into a process control system capable of meeting all the needs of the mining industry. It uses 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 mining plants. The functions are preconfigured and proven over many years in practical use. This makes engineering easy, fast, and reliable.



What does Minerals Automation Standard look like? The Minerals Automation Standard offers many unique features that make the operation of a mine simpler and more efficient: In the process display, a block icon showing the status, the operating mode, the plant identifier, and the most important values represents each component. The picture navigation follows the technological hierarchy of the plant and shows a summary of alarms and warnings of subordinate structures. An alarm line offering the top priority messages and buttons for all necessary functions like archives, trends, language change or user management answers all operator requirements.



What's on offer?

The Minerals Automation Standard contains more than 25 technological function blocks with integrated operation and signaling functions, as well as several block icons and faceplates. The scope of library elements is extended by pre-configured and ready-to-use process tag types, e.g. for different types of motors, which can be used for an efficient bulk engineering. The library concept provides consistency from the control level to the operator level.

Increase engineering efficiency with the library approach



What is a library object?

A library object like a drive, a valve, or an analogue process value consists of:

- A function block containing the logic for the controller level
- A block icon for visualization in the process picture
- A faceplate for operating the equipment (e.g. Start, Stop) and more detailed information, like comments, fault status, operator permission, operating conditions and filtered alarm list.



How does the library speed up the engineering process?

The CFC (Continuous Function Chart) editor is the tool for graphical configuration and commissioning of the controller functionality. Function blocks can be positioned from the library via drag and drop, configured and interconnected within CFC for the specific program. No need for specific programming expertise. In addition the visualization functionality and simulation features are already integrated in every library module and results in minimized engineering and test effort on the visualization part and final the test of the program.



How does the library assist your plant operations?

- Block icons and faceplates are consistent, clearly structured and easy to understand/ intuitive
- Automatically generated jump functions allow the operator to find the cause of a fault faster and more easy
- First fault relevant signal detection is available for the interlocking
- Alarms, events and operation are logged for each object

Process areas can be started and stopped in sequences in automatic mode via the group module. Additionally single equipment can be run individually in manual mode or in local mode via a local switch in the field. Different options are available and allow easy adaptations to the customer's requirements.

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.

Enhanced plant operation

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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. Minimum downtime and the optimum use of staff and resources are key to sustainable success in industry. Siemens provides the basis for greater productivity, flexibility, and efficiency with technology-based services throughout the lifecycle of an industrial plant – reliably, globally, and around the clock. In-depth technology and product knowledge as well as industry expertise within Siemens' global expert network ensure a considerable competitive edge.

Technology-based services for a greater competitive edge

Siemens offers far more than just products and systems: a comprehensive range of services is available for the mining industry worldwide.

From the start-up, to the mine operation across the entire lifecycle for products and systems, Siemens provides industry services tailored to the mining needs. Engineering support and technical consulting from Siemens assist customers with specialist expertise right from the beginning. In the start-up phase of a mine operation, Siemens provides services and solutions, such as online and technical support. For mining operations, the available operational support and maintenance services can be enhanced, e.g. by Repair- and Spare Parts Services as well as Field Services. Furthermore, Siemens supports mine operators to face new challenges and changing conditions – with the necessary know-how and experience providing minespecific technologies for modernization and optimization requirements as well as energy and environmental features.



Benefits at a glance

Minerals Automation Standard is a highly innovative, comprehensive approach for the mining industry. It is aimed at improving long-term competitiveness – by optimizing productivity, plant availability and efficiency. To achieve this, Mineral Automation Standard delivers the best possible ROI (Return on Investment) at the lowest possible cost, based on high technological standards provided by Siemens, the responsible and reliable partner with global expertise and reputation in mining automation.



Success Story in Mining Automation



BHP Spence copper mine

Construction of the Spence copper mine, represented for BHP Billiton Chile, the "project of the 21st Century" – a unique chance to implement state-of-the-art technology and the latest innovations available in the market. BHP Billiton's basic principle of "Zero Damage" and workers' protection, as well as high efficiency requirements, demanded from the automation system the highest degree of availability and reliability. SIMATIC PCS 7 was the chosen solution for the automation demands of the mine, which has now become a milestone and an example to follow in the global mining industry.

Major Customer Benefits

- High availability through redundancy
- Open system with ease of integration
- Comprehensive support
- Wireless communication allows plant monitoring beyond the control room

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