Products and Functions for Efficient Maintenance in Totally Integrated Automation

Brochure · April 2012

Maintenance System

Answers for industry.
Introduction

Increased productivity through intelligent maintenance

Plant Asset Management

Efficiency requirements are the same for both production and maintenance. In reality this means optimizing deployment of human resources and economizing on material and energy. The aim is to secure and improve reliability and quality while cutting costs. Advanced technology ensures efficient plant asset management.

Totally Integrated Automation .
Efficiency in maintenance

SIMATIC Maintenance Station visualizes maintenance information from the automation systems of a plant. From the controller, through the network components, to switching, protective and control devices and drives. Each component provides its own specific functionality. Despite its complexity, configuration of the Maintenance Station is extremely easy; you simply integrate the components on the basis of established standards and uniform procedures.

Identify quickly. Act correctly.
SIMATIC Maintenance Station

SIMATIC Maintenance Station provides you with a quick overview of the status of your automation systems. The relevant data, from a wide variety of connected stations, is visualized uniformly and clearly. Details can be accessed quickly as needed by way of additional views.
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How do you increase the productivity of a plant with a high level of automation even more?

Plant operators in all industries consider increased availability and shorter downtimes to be the most effective lever toward increasing productivity. Investigations have shown that downtimes are frequently the result of insufficient maintenance – despite the fact that maintenance is responsible for a significant portion of the lifecycle costs.

Intelligent maintenance strategies

**Preventive maintenance – time or load-based**
You avoid downtimes by implementing maintenance measures before problems occur. You can easily schedule such measures based on time or workload. Regular maintenance work is an example of time-based measures. Maintenance based on workload is determined by the number of switching operations, operating hours or peak loads.

**Condition monitoring for efficient use of the entire service life**
It provides information on the remaining useful service life. Condition-based maintenance involves implementing maintenance measures only when the wear of the device or device parts has exceeded a certain limit.

**Optimum results through smart combinations**
It has been shown in practice that you achieve optimum results when you combine different maintenance strategies in a smart way.

**Efficient maintenance for Totally Integrated Automation**
Totally Integrated Automation supports intelligent maintenance strategies. The SIMATIC Maintenance Station is of significant importance in this matter. It presents the information relevant to maintenance from all automation components in a central, uniform and clear manner, providing valuable support for maintenance engineers in their decision making.

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**Benefits of intelligent maintenance**

- Continuous plant monitoring
  - Reduces the risk of failures and increases availability
  - Makes for planned maintenance

- Optimized use of maintenance resources
  - Increases maintenance quality
  - Reduces costs

- Provides savings potential
  - During engineering
  - During maintenance itself and by preventing follow-up costs
Plant asset management as a maintenance task

**Plant Asset Management**

The term "asset management" originates in the world of finance and economics and refers to the manner in which a company deals with its long-term and current assets. In conjunction with production, asset management covers all activities and measures that help to retain or increase the value of a plant. This is called plant asset management.

The objective of plant asset management is

- to clearly identify and evaluate the assets, which means the production equipment and associated components,
- to carry out suitable measures in case of deviations from the desired or expected state.

Plant asset management is a maintenance task.

**SCADA system as a central information interface**

Maintenance staff must

- ensure high availability of the plant,
- ensure this availability over the long term by implementing optimization measures, and
- carry out maintenance measures with minimum use of personnel, material, energy, monetary resources, etc.

Maintenance staff receives information about the state of the plant via the SCADA (Supervisory Control and Data Acquisition) system. The SCADA system also serves as the information interface for the production staff.

**Task-specific information needs**

As a result of their different tasks, operators and maintenance staff need different types of information: Operators need process-related information; maintenance engineers require information on the state of the production facility.

**Advantages of a shared visualization system**

Despite the different tasks of operators and maintenance staff, it is important and necessary to map the information for both groups in one visualization system and not in different systems.

There are various reasons for this:

- Uniform view of all components, devices and their diagnostics data.
- Information on plant components is relevant for automation and maintenance.
- There is a close relationship between automation and asset management functions.
- Engineering data for automation can also be used for maintenance purposes.

With Totally Integrated Automation, the same system can be used for automation and maintenance: SIMATIC WinCC, the SCADA system for Totally Integrated Automation with the SIMATIC Maintenance Station option for efficient maintenance.

![Graph showing cost advantage](image)

Savings potential of the SIMATIC Maintenance Station. Reduced training costs.
SIMATIC Maintenance Station
Intelligent maintenance of plant automation systems

SIMATIC WinCC is the central information interface for operator control and monitoring of a plant as well as maintenance. The information is grouped to prevent that operators and maintenance engineers are flooded with information. For this purpose, a Maintenance Station is introduced in addition to the actual SCADA system. The operator can use the SCADA system to access all process-relevant information and can manually intervene in the plant process. Maintenance-relevant information is not included in the SCADA system. This information is provided for maintenance engineers on the Maintenance Station. It is irrelevant if the SCADA system and the Maintenance Station are run on one or on separate computers. Because the same HMI tools are used, operators can switch between the SCADA system display and the Maintenance Station display at any time. The maintenance station visualizes maintenance information from the complete automation technology of a plant. This includes:

- Industrial PCs
- Controller
- Fieldbuses and field devices
- Switching, protective and control devices
- Drives
- Network components

Each component makes its individual functionalities available to the overall system. Based on established standards, devices from many different vendors can be integrated.

Easy configuration

The SIMATIC Maintenance Station is based on the STEP 7 project or multiproject already created for the plant automation. The maintenance view in the form of hierarchical, completely linked WinCC displays is automatically generated from the existing hardware configuration. This “maintenance area” is subsequently transferred to the WinCC station and can be linked as required to the existing HMI displays. Maintenance engineers can adapt the GUI to their own requirements easily.

Advantages for designers and operators of plants

Operation of the Maintenance Station results in cost and productivity advantages throughout the entire lifecycle of a plant, especially during configuration and during operation.

- Machine manufacturers and system integrators benefit from the automatic creation of diagnostics projects (screens, navigation, messages, diagnostic information and user interfaces). This approach reduces engineering times and costs to a minimum.
- Plant operators can expect increased availability and productivity of their plants. Specific diagnostic information and integrated handling make it possible for maintenance personnel to detect errors and deviations more quickly and act before the plant fails.

The SIMATIC Maintenance Station supports smart maintenance strategies which apply mainly preventive measures instead of corrective maintenance. Existing potential is optimally utilized. The result is increased availability, shorter downtimes, reduced production and maintenance costs as well as increased planning reliability.

Benefits of maintenance with Totally Integrated Automation

- Uniformity applies to both automation and maintenance;
- The SIMATIC Maintenance Station displays maintenance information from the entire automation technology;
- The maintenance view is automatically derived from the STEP 7 hardware configuration;
- In addition, you can integrate any component via a proxy concept;
- The generation process generates data from the STEP 7 project;
- No additional engineering required;
- Data, visualization and operation of the SIMATIC SCADA system and SIMATIC Maintenance Station are consistent and uniform;
- In plants with production plant units and process engineering units, central visualization of all maintenance information is possible via the SIMATIC Maintenance Station.
More productivity with Totally Integrated Automation

Maintenance across plants and systems

The Maintenance Station displays maintenance-relevant information on a shared computer even if some plant units are visualized using SIMATIC WinCC and others using SIMATIC PCS 7. This situation is often encountered in process engineering plants consisting of raw material supply (inbound process), production process, packaging and outbound logistics (outbound process). In this case, too, you do not have to establish and maintain different types of expertise within the maintenance team. Due to the uniformity of Totally Integrated Automation, it is possible to collect the diagnostic information of the entire process chain on one shared client. Display, logic and message management are identical.

Optimizing instead of repairing

In addition to the primary goal of avoiding unplanned downtimes and thus loss of production, maintenance has another task: optimization of the plant. For this purpose, the Maintenance Station offers a central database (messages, diagnostic interrupts, operator actions in answer to diagnostic messages) to permit a comprehensive weak point analysis. All events can be traced uniquely based on time stamps and component designations. Until now, diagnostics frequently had been limited to signaling an error without any further actions after elimination of the error. With Totally Integrated Automation, the Maintenance Station will form the basis for Total Productive Maintenance.

Central control room with plant-wide maintenance overview

In this case, suitable protective measures (including IT security such as network segmentation) should be taken in order to ensure safe operation of the plant. For more information on the topic of industrial security, go to www.siemens.com/industrialsecurity.
Visualization of information for maintenance purposes

A uniform symbol representation has been implemented to clearly identify the condition of individual devices or components.

There are symbols for the device status itself as well as those indicating the significance of a maintenance request. In addition, the status of a maintenance measure is displayed. The condition of all devices and equipment as part of automation technology is indicated by these standardized symbols.

The overview display uses the standardized symbols to visualize the condition of a component itself and to provide group information on the condition of all devices in the subordinate hierarchies.

The group status message indicates the OK condition or the seriousness of a possible problem by displaying a traffic light with the colors red, yellow and green. Use a control button to access all subordinate hierarchy levels step-by-step all the way down to the lowest device level.

Additional views of the maintenance information are available so that the maintenance engineer has a complete overview of all current information available on the component with regard to maintenance. This setup permits assessment of the plant status at a glance.

The information has a consistent structure in hierarchical order. The quantity of information displayed on each individual screen will remain manageable for the maintenance engineer, who always has easy access to all information at any time.

Detailed view of a component

Display hierarchy of the SIMATIC Maintenance Station
User interface for maintenance

The optional SIMATIC Maintenance Station package is available for SIMATIC STEP 7 and SIMATIC WinCC for plant asset management. You use this software to expand a SCADA system to become a Maintenance Station. The Maintenance Station displays information on plant maintenance for the connected control components, switching devices, drives, etc.

Single-user system

The SIMATIC Maintenance Station has a modular design. With small plants it is possible to install the SCADA system and the Maintenance Station on the same PC.

Client/server system

Just like the SCADA system, the Maintenance Station can be expanded to a client/server application with multi-client operation. The signals and messages from the components and devices which are relevant to maintenance are collected and saved on the server of a client/server application. They will be displayed on the client.

The SIMATIC Maintenance Station is based on standard SIMATIC products:

• SIMATIC STEP 7 (including “system fault signaling”) for configuration
• SIMATIC WinCC for operator control and monitoring
• SIMATIC SNMP OPC Server for interfacing of network components and industrial PCs

Configuring a maintenance station

In order to set up a Maintenance Station, the user need only select the automation systems to be diagnosed.

The components configured in the STEP 7 project/multiproject are mapped. It is additionally possible to incorporate further components into diagnostics using proxy blocks.

The automatically generated diagnostics screens can additionally be supplemented with project-specific contents and connected with any available operating and monitoring screens.

Visualization in the maintenance station

In the operating state, the maintenance station’s client requests cyclic data from the associated server. Various components with highly different diagnostic capabilities are used in a plant. However, from the viewpoint of maintenance, all components are to be displayed in the same manner. Therefore the maintenance and diagnostics states of the components are represented by standardized symbols.

The symbols indicate the maintenance status

• of a component (Maintenance State Display)
• of subordinate devices (Maintenance Group Display)
• and, if applicable, the status of maintenance work (Operator State Display).
Symbol displays and component faceplates

The conditions of the components or also of subordinate components are visualized using standardized symbol displays in the diagnostics displays.

Symbol display of a component

The symbol displays of the components contain:

- Graphical representation of the component type
- Configured name of the component
- Maintenance state display
- Group display for maintenance messages from subordinate components

Selecting an element in the symbol display either opens the subordinate hierarchy level or a component faceplate. This faceplate contains various views of the respective component in which further device-specific information can be output.

There are three standard views:

Identification

Depending on the component, the Identification view displays all of the information available from the configuration or displays it as so-called Identification & Maintenance (I&M) data available directly in the component.

Identification view with I&M data

The I & M data for PROFBUS and PROFINET were standardized by PROFIBUS and PROFINET International to ensure that they apply for all vendors. They contain, for example, information on the device manufacturer, the order number, hardware and firmware version, etc. The maintenance engineer has quick access to all relevant device and diagnostics data. Device manufacturers also provide EDD (Electronic Device Description) data. The information in this data is also displayed in device dialogs of the Maintenance Station.
Messages

The Messages view displays diagnostics error messages and maintenance requests for the selected component. The view can be switched between current or archived messages.

All system events and operator actions can be traced by means of messages. This creates an important database for subsequent analyses which are implemented by functions familiar from WinCC. Client/server applications are possible, as are WinCC Web applications.

Maintenance

The Maintenance view is used for the response of the operator to a maintenance request of a component. Maintenance work can be requested.

Print jobs or maintenance job requests can be sent to other systems direct from the device dialog. Notification by means of SMS, e-mail, or pagers is also possible.

Furthermore, the status of the work can be specified. This is recorded, and signaled in the symbols. A work instruction number and a comment can be entered for each work request. The instruction number is included in the report. This can be used for transfer to maintenance planning.

On the basis of the information present in the SIMATIC Maintenance Station per message and status display, comprehensible actions can be initiated by the user and documented by means of WinCC operator input messages.

This supports the maintenance workflow on the one hand, and generates a comprehensive database for subsequent plant optimization to reduce maintenance costs on the other.

SIMATIC Maintenance Station

- I & M data are displayed automatically.
- Cross-vendor standardization by PROFIBUS and PROFINET International permits the automatic display of I & M data from different vendors.
- Data need not be collected manually, they are recorded automatically.
  This saves time and eliminates errors.
- Automatic messages mean that events and operator inputs are fully comprehensible, providing a basis for subsequent evaluation.
- Access to the database is possible using the proven WinCC options:
  Server/client applications, Web applications.
Advanced functionality based on WinCC add-ons

Alarm Control Center alarm management system

The WinCC Alarm Control Center (ACC) add-on transmits messages from visualization and control systems to mobile receivers such as cell phones or pagers.

The messages are automatically sent to the responsible person or group of people. If no response is received within a programmable period of time from a notified person (such as a reply SMS text message), other people are notified. In conjunction with the escalation system, alarm scenarios can be implemented for a wide range of requirements. Even the basic package incorporates a shift management facility, enabling personnel to be assigned depending on the time and the day of the week.

SMS messages are sent via ISDN, analog modem or GSM modem. For additional requirements, transmission channels are available for systems including VOIP, voice and PABX systems. Configuration and user control is web-based, via LAN or Wireless LAN.

Further options allows the Alarm Control Center to be adapted to individual requirements. The replication option enables high-availability, redundant systems to be configured. The Dialog module permits active contacting of stations, such as to log off a station by remote configuration or to query process values. Advanced call archive analysis enables detailed logs to be generated, and supports other quality assurance measures.

Further information: www.siemens.com/alarmcc

PM-MAINT intelligent maintenance management

PM-MAINT can be used for planning, based on performance data or calendar intervals, so as to define clearly when which maintenance tasks are to be carried out. Damage reports and repair jobs from the SIMATIC Maintenance Station also enable unforeseen maintenance work to be scheduled.

Management of supplementary information

Data essential to effective maintenance can be entered relating to the maintained plant and machinery. In addition to component, manufacturer and sourcing data, electronic documents can also be linked to the items and related maintenance jobs. This provides maintenance staff with direct access to aids such as repair instructions, circuit diagrams, photos, manuals and the like.

Further information: www.siemens.com/pm-maint

Archiving of maintenance data

All maintenance activities are logged in an archive. Analysis of the archive enables maintenance operations to be assessed in detail, providing for continuous improvement.

Further information: www.siemens.com/pm-maint
Monitoring and diagnostics

Continuous monitoring and diagnostics for components subject to wear

Predictive maintenance permits an increase in plant availability with a simultaneous reduction of lifecycle costs. With the SIPLUS CMS Condition Monitoring System, the states of components subject to wear (such as motors, gear units, bearings, etc.), and critical machine parts can be continuously monitored.

The continuous monitoring, recording, and evaluation of trends and thus the early detection of impending failures are a suitable means of minimizing downtimes and for scheduling necessary maintenance work to suit the production cycle.

The SIPLUS CMS monitoring system is available in different variants, depending on the requirements and intended area of use: from easy and compact, to modular and powerful.

SIPLUS CMS1000 – the compact and simple solution

SIPLUS CMS1000 offers an easy introduction without any expert knowledge being required.
- Characteristic value based monitoring
  - RMS (machine vibration)
  - DKW (bearing monitoring)
- Traffic light display of machine status

SIPLUS CMS2000 – the modular and configurable solution

SIPLUS CMS2000 is an easy-to-configure, Web-based system.
- Detailed identification of damage by means of frequency-selective diagnostics
- Raw data recording and export for SIPLUS CMS X-Tools
- Trend recording and analysis
- Monitoring of process variables
- Modular expansion possible with temperature modules from the SIMOCODE family
- Otherwise, the same functionality as with the SIPLUS CMS1000

SIPLUS CMS4000 – the powerful solution

SIPLUS CMS4000 is the scalable, freely-configurable system for detailed and comprehensive diagnostics and status monitoring.
- Configurable analysis models with know-how protection
- Easy integration into existing automation systems
- Recording of process signals
- Otherwise, the same functionality as SIPLUS CMS2000

Maintenance functionality with SIPLUS CMS

SIPLUS CMS is easily integrated into the SIMATIC Maintenance Station. Data is exchanged via the standardized interface. Alarm messages and limit violations are visualized in the Maintenance Station. For detailed analyses, the user can directly access the X-Tools diagnostic tool of SIPLUS CMS.

Further information is available on the Internet under www siemens com /siplus

Highlights

■ Constant monitoring for the protection of machines and processes
■ Early detection of damage
■ Optimum utilization of the service life of the units
■ Better maintenance planning
■ Secure with regard to investment, since suitable for retrofitting and new plants due to its high degree of scalability
■ The current application is not affected due to reaction-free configurability

The SIPLUS CMS family
**Monitoring and diagnostics for industrial PCs**

SIMATIC IPCs are rugged industrial PCs for professional automation solutions operating 24 hours a day. Because of their high system availability, they are used in production automation in the field and management levels.

The DiagMonitor monitoring and diagnostic software for industrial PCs detects possible hardware and software faults early on and provides corresponding messages for the SIMATIC Maintenance Station. In connection with several SIMATIC IPCs, client/server network architectures can be set up via LAN and can centrally monitor all SIMATIC IPCs in plant facilities using DiagMonitor. The integrated Web server lets you view and manage data independently on site, PC architecture and operating system via an Internet browser over an http or https link. Efficient service structures can be established by integrating automated communication paths, e.g. by means of Ethernet, e-mail, or SMS (telephone text message).

DiagMonitor supplements the operating data of the monitored IPCs by text messages, transmits them to the SIMATIC Maintenance Station via the SNMP OPC server, and outputs them clearly in various views.

The following are monitored and signaled:

- Temperature readings exceeding or falling below the permissible operating temperature range by measuring various points in the device, such as points on the processor and motherboard
- Fan speeds/failure (including open-circuit)
- Hard disk condition/problems
- Program interruption (watchdog)
- Maintenance intervals (freely selectable) by means of parameterizable runtime meter

It is then possible, for example, for the user to replace hard disks as a preventive measure before a loss of data occurs. In the event of an alarm, the DiagMonitor also starts autonomous programs such as special PC tools or user-specific applications for individual response to alarms.

### Advantages at a glance

#### Increase in productivity through avoidance of potential failures

- Diagnostics and signaling functions for PC temperature, fan, disk drives, system status (watchdog)
- Runtime meter for preventive maintenance, operating data recording, and analysis capability
- Integrated log function, comprehensive text messages and online help in German and English

#### Reduced costs thanks to reduced downtimes

- Fast delivery of information to service personnel due to communication via e-mail, SMS
- Fast response through communication with the application via OPC and SNMP

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**SIMATIC IPC DiagMonitor supports fast detection and efficient prevention of potential system failures**

(www.siemens.de/diagmonitor)
Remote Management through remote access to industrial PCs – with SIMATIC IPC Remote Manager

SIMATIC IPCs with Intel Core processors i7 and i5 are equipped with the Intel Active Management technology (Intel AMT) for password-protected remote access. With the new SIMATIC IPC Remote Manager software package, you save time and money with maintenance, fault rectification and management.

SIMATIC IPC Remote Manager can be used to implement central service concepts in which SIMATIC IPCs can be remotely accessed by means of AMT functions. For example, system or program errors can be rectified, or BIOS and program updates can be implemented from a control room without the need for on-site deployment.

Advantages at a glance

- Central service without on-site deployment
  - Remote access via protected HTTPS or TLS link, without additional hardware and independently of the operating system
  - Easy rectification of errors in the software, applications or operating system
  - Rapid implementation of BIOS and program updates with a subsequent restart

- Efficient energy management and service management
  - Reduced power consumption and costs due to timed coastdown, e.g. following production stop or over the weekend.
  - Reduced downtimes and costs since start-up and service work are performed outside the normal production times

Overview of functions

Keyboard Video Mouse Redirection (KVM)
The keyboard-video-mouse signal can be redirected to or from a computer in the IT department, so that an administrator can operate the computer remotely without additional hardware.

Remote reboot
The computer can be rebooted from a hard disk, CD or a network drive. This saves the service engineer time-consuming and expensive traveling.

Remote Power Control
You can reduce the energy/operating costs with targeted switching on and off. The computer can be shut down at night or at the weekend, or it can be switched on temporarily for an update. A reset is possible at any time.

IDE redirection
To prevent time-consuming handling, for example, an ISO file located on a hard drive of the IT Management Console can be made available as a CD-ROM drive.

In this case, suitable protective measures (including IT security such as network segmentation) should be taken in order to ensure safe operation of the plant. For more information on the topic of industrial security, go to www.siemens.com/industrialsecurity.
Network monitoring and diagnostics

In addition to reliable communication, the network components of SIMATIC NET also offer a facility for network diagnostics during runtime. This permits early detection of weak points and rapid locating in the event of a fault – a major boost to plant availability.

Monitoring of PROFINET/Industrial Ethernet

In addition to the communication of conventional diagnostics events, PROFINET also permits standardized signaling of information relevant to maintenance. A standardized device status model has been defined for this by PROFIBUS and PROFINET International.

This possibility is used, for example, to signal an increased attenuation on optical transmission links (POF) at an early point in time. The associated cable can then be replaced during planned maintenance. This avoids unplanned downtimes.

Network components

Network components are SCALANCE X (Industrial Ethernet switches), SCALANCE W (Industrial WLAN), SCALANCE S (Industrial Security) and SCALANCE M (modems and routers).

SCALANCE X-200 managed

For universal use, from machine-level applications to networked subsystems. Configuration and remote diagnostics are integrated in the STEP 7 engineering tool. This increases plant availability. Devices with a high degree of protection permit a cabinet-free construction. Corresponding switches (SCALANCE X-200IRT) are also available for use in subsystem networks with hard real-time requirements and maximum availability.

SCALANCE X-300 managed

Networking of subsystem/plant areas, as well as linking to the enterprise network. The SCALANCE X-300 managed product line combines the firmware functionality of SCALANCE X-400 with the compact design of SCALANCE X-200. The SCALANCE X-300 switches thus offer expanded management features and firmware functionality in comparison with the SCALANCE X-200 switches. Moreover, electrical and optical Gigabit Ethernet ports are available, as well the XR-300 Rack Switches as versions in 19-inch design.

SCALANCE X-400 managed (Layer 3)

For use in high-performance plant networks (such as those with high-speed redundancy). Thanks to the modular design, the switches can be adapted to the respective task. Due to the support of IT standards (such as VLAN, IGMP and RSTP), the seamless integration of automation networks into existing office networks is possible. Routing functions on Layer 3 permit communication between different IP subnetworks.

SCALANCE X-500 managed (Layer 3)

For networking and structuring high-performance industrial networks and for connecting office networks to automation networks. As a Layer 3 switch, SCALANCE X-500 can be used as a central component in backbone networks, e.g. when a high number of slots is required, at extremely high transmission rates (10 Gigabit Ethernet), or for redundant connection to an office infrastructure.

SCALANCE W

Thanks to wireless communication, an even higher level of plant flexibility can be achieved, maintenance work is simplified, and service times and downtimes are reduced. The IWLAN solution from Siemens Industry makes these advantages available through a coordinated portfolio of WLAN equipment for industrial use, even for fail-safe communication in the context of operator and machine safety. This includes IWLAN access points and client modules (SCALANCE W), wireless interfaces for PROFIBUS and distributed I/O, mobile operator panels, planning software, and extensive accessories.

SCALANCE S

The SCALANCE S security modules enable logging of access data via SNMP in one log file (syslog protocol). These data show how, when, and by whom the network has been accessed. Attack attempts can be detected early and appropriate preventive measures taken.

SCALANCE M

The SCALANCE M modems and routers ensure reliable connections, e.g. via the mobile network. The devices can be integrated into a network management system via SNMP. Diagnostic messages can also be sent by SMS.
Network Management
The integrated network management with the standard SNMP (Simple Network Management Protocol) in SCALANCE X, W, S and M provides information for the diagnosis of devices.

The network management products SINEMA Server (Management), and the SNMP OPC server provide support in the planning and simulation or monitoring and diagnostics of wireless and wired networks in the industrial environment. SINEMA Server is specifically used in larger networks and for extensive network management. The SNMP OPC server is used exclusively for the processing of SNMP message frames and their transfer to be represented in other systems.

SINEMA Server Network Monitoring
SINEMA Server is a tailor-made solution for the fail-safety and documentation of networks, as well as the integration of network diagnostics in SCADA systems.

SINEMA Server Network Management software diagnoses and visualizes Ethernet networks. It continuously logs network activities using various protocols such as SNMP, DCP and LLDP and makes them available to users and other systems on the network, e.g. HMI software such as WinCC, for evaluation and further processing. Using autodiscovery, automation systems as well as their topology and properties are recognized and network statistics are compiled. These can be displayed graphically and, if desired, also enhanced using individual diagnostics screens.

In addition, cyclic data from Ethernet participants is queried and network alarms are signaled during runtime. Websites are used to present and pass on information which is available from the server to up to 10 users simultaneously. Furthermore, the software offers an e-mail client function and OPC server in order to forward network data and alarms to other systems. SINEMA Server can be easily integrated in HMI (Human Machine Interface) and visualization systems such as SIMATIC WinCC. Changes in the network are accordingly logged and archived in a database. For the analysis of past network failures or as evidence of network availability, the database information can be prepared and documented as reports for any configurable period of time. The SINEMA Server user interface and the available features are accessible via the browser from any computers on the network.

The most important functions and features at a glance:
- Automatic device detection and generation of network topologies
- Monitoring and visualization of industrial networks
- User defined display
- Diagnostics via web browser
- Standard diagnostics via SNMP
- Easy-to-understand network reports, alarm messaging of events
- Integration in HMI/SCADA systems
- Intuitive operation

SNMP OPC Server
The SNMP OPC Server enables diagnostic and configuration data to be read from any Ethernet devices and displayed on the Maintenance Station. Alongside standard maintenance data, simple plant network problems such as failure of a line can be quickly and easily detected by means of this software.

Device configuration is integrated into STEP 7. Ethernet devices can be read from a STEP 7 project or, using the autodiscovery function, directly from the live network. The user can easily add all detected devices to the device list for monitoring on the OPC Server. Then this configuration data is exported into the Maintenance Station, where tags, alarms and faceplates are automatically created for the devices concerned.
Monitoring of AS-Interface

Below the PROFINET and PROFIBUS bus systems the AS-Interface, an open and vendor-independent bus system, connects the sensors and actuators in the field. Actuators and sensors are connected with programmable logic controllers via a 2-wire cable and this permits simultaneous transferring of data and energy. AS-Interface is therefore positioned between the automation world and the machine. As an industrial bus system, AS-Interface can transmit safety-relevant data in addition to operating data.

To connect binary and analog signals in this machine-level environment, AS-Interface satisfies further requirements, e.g. power supply to the interfaces and the sensor electronics over the data line, and suitability for field applications up to IP65/67.

Maintenance functionality with AS-Interface

AS-Interface is seamlessly integrated in the SIMATIC system diagnostics. Using object managers, the system diagnostics is simple, secure and uniform by means of the existing SIMATIC tools. AS-Interface is therefore fit for a variety of maintenance tasks.

For hardware components, AS-Interface also supports high-speed signaling of maintenance-relevant data at any time. The DP/AS-i LINK Advanced is a PROFIBUS DPV1 slave and an AS-Interface master. This allows transparent data access to AS-Interface from PROFIBUS DP.

The DP/AS-i LINK Advanced is thus ideally suited for distributed configuration and for linking an underlying AS-Interface network:

- An integrated Ethernet port permits Web interface diagnostics and reduces the number of external switch ports.
- Complete startup and diagnostics on site without additional tools and within a short amount of time.

Thanks to the new IE/AS-i LINK PN IO, AS-i is also optimally suited for PROFINET. Data can be recorded via the AS-Interface integrated in sensors or actuators, or via modern, rugged and compact modules such as the new K20 compact module. The new AS-i specification also permits joint transmission of binary and analog data – without loading the controller with coordination tasks. The status displays of all AS-i slaves (and ASIsafe slaves) can be generated centrally on the SIMATIC Maintenance Station and visualized with the aid of pre-compiled WinCC diagnostics screens.

View of an AS-i network (I&M data; error status)

Changes can also be made to the hardware during operation without having to regenerate the SIMATIC Maintenance Station. All the prerequisites for comprehensive provision of data are therefore satisfied as the basis for different maintenance strategies.
Monitoring and diagnosis of distributed I/O

Flexible, distributed solutions have become an indispensable feature in modern automation solutions since these result in significant cost savings. The modular SIMATIC ET 200 range permits distributed solutions for every sector. Whether compact or modular, purely digital I/O interfaces or complete distributed systems with drive technology, installed in the control cabinet or directly in harsh industrial environments.

Integrated engineering and diagnostics

The SIMATIC ET 200 I/O systems offer powerful, multi-level diagnostic systems within the framework of Totally Integrated Automation for faults that occur in the control system (system diagnostics). System faults are automatically detected and are caught by programmable exception handling routines. Furthermore, such system faults are signaled to the connected Maintenance Station and displayed there in an appropriate manner.

During startup and runtime, the automation system topology with the ET 200 stations is offered as overview diagnostics. Module diagnostics provides more detailed information on the individual modules, and includes, for example, short-circuit testing of sensor power supply and outputs.

Modules with diagnostic capability monitor each channel for short-circuit and wire-break. This makes it possible to react immediately to every irregularity and process event. The response of the controller can easily be programmed with STEP 7.

Utilization of the system diagnostics functions of the SIMATIC ET 200 I/O systems is easy and user-friendly thanks to the SIMATIC Maintenance Station. The modular ET 200 stations can be displayed in a detailed representation with their diagnostics conditions, where station, module and channel diagnostics are visualized.

Solutions in the control cabinet

<table>
<thead>
<tr>
<th>SIMATIC ET 200S – the all-rounder with a comprehensive range of functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalable design with multi-conductor connection</td>
</tr>
<tr>
<td>Multifunctional thanks to a wide range of modules: Motor starters, frequency converters, safety technology, distributed intelligence</td>
</tr>
<tr>
<td>Highly compact thanks to the 8-channel modules 8 DI 24 V DC and 8 DO 24 V DC/0.5 A</td>
</tr>
<tr>
<td>For use in hazardous areas (Zone 2)</td>
</tr>
<tr>
<td>Also available as expandable block I/O with integral DI/DO: SIMATIC ET 200S COMPACT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIMATIC ET 200M – the multi-channel S7-300 I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modular design using standard SIMATIC S7-300 modules; redundant design also possible</td>
</tr>
<tr>
<td>Fail-safe I/O modules</td>
</tr>
<tr>
<td>For use in hazardous areas up to Zone 2, sensors and actuators up to Zone 1.</td>
</tr>
<tr>
<td>High plant availability thanks to redundancy, hot swapping and configuration changes during operation (CiR)</td>
</tr>
</tbody>
</table>

Solutions without a control cabinet

<table>
<thead>
<tr>
<th>SIMATIC ET 200pro – modular and multifunctional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modular design with an extremely compact enclosure (small footprint)</td>
</tr>
<tr>
<td>IM 154-8 CPU for on-site intelligence (performance range as for CPU 315-2 PN/DP)</td>
</tr>
<tr>
<td>Easy installation</td>
</tr>
<tr>
<td>Multifunctional thanks to a wide range of modules – from simple inputs and outputs through safety technology, motor starters, all the way to MOBY identification systems</td>
</tr>
<tr>
<td>High plant availability thanks to hot swapping and permanent wiring</td>
</tr>
<tr>
<td>Comprehensive diagnostics (e.g. current value transmission)</td>
</tr>
</tbody>
</table>
Monitoring and diagnostics of 24 V load feeders

Automation components are usually supplied with 24 V DC. With the SITOP PSE200U selectivity module, any 24 V load is reliably monitored for overload and short circuit and in the event of faults it is switched off. A selectivity module monitors up to 4 load feeders which can also be connected in sequence following defined periods in order to offload the power supply.

SITOP PSE200U selectivity module

Monitoring and diagnostics of wear in the motor environment

There are a number of wear fields in the motor environment: the power distribution, the motor feeder or converter, the motor itself, the supply lines, and the machine that the motor drives. It greatly benefits the user if routine (visual) inspections by the servicing personnel, e.g. in order to determine the condition of the main contacts of contactors, can be omitted and if the device can diagnose its own condition.

Condition monitoring records the wear with the aid of measured values, which can be used to determine the condition of the affected components. It is therefore possible to determine the optimum time for maintenance depending on this condition.

Continuous system monitoring allows for intelligent maintenance with the optimized use of maintenance resources. Siemens offers a range of protection and switching devices for the motor environment that are compatible with condition monitoring.

Intelligent maintenance with protection and switching devices

Siemens protection and switching devices are

- Powerful products for industrial controls with comprehensive basic functions and
- Information for condition monitoring.

In these devices, the data or acquisition variables needed for the basic functions are also used for condition monitoring, or condition monitoring statements can be derived from this data. The devices also have additional analog inputs that can be used to connect special sensors for condition monitoring analyses (for example, SIMOCODE: www.siemens.de/simocode).

Special devices purely for the purpose of condition monitoring, such as for monitoring bearings or pumps, are needed only when a large number of measured values must be recorded or they reach a very high degree of complexity.

Communication capability and integration in the Maintenance Station

In addition to the condition monitoring capability of the devices, they also have corresponding communication functions so that they can be optimally integrated into systems and plants. Furthermore, they are integrated in the Maintenance Station as follows:

- Via device ID IM0
- Via driver output for control of the device condition status
- Via detailed diagnostics of the device condition (device-specific).
For devices with an AS-Interface connection, integration into the Maintenance Station takes place via suitable SIMATIC S7 communication processors (CPs) or AS-i links.

**Acquisition variables for wear fields**

**Contact erosion**
The contact condition, and thus the remaining life time of a contactor, can be determined directly based on the degree of contact erosion. You can use this at the same time to determine the condition of the power distribution, the motor feeder, or the converter.

**Number of starts, breaking current**
The number of starts, or the level of the breaking current, indirectly provides you with information about the erosion of the switching contacts (empirical values, manufacturer information). Using empirical values, it is also possible to make statements about the load of the driven machine.

**Number of operating hours (with/without limit value)**
The runtime affects the wear on the motor and the machine. The need for maintenance can be determined based on empirical values, user knowledge or manufacturer information.

**Number of overload tripping operations**
Overload tripping operations can be caused by different issues. They can provide information about the condition of the machine or plant, or they can signal an incorrect setting or motor selection. If necessary, the motor size should be changed.

**Current limit/overload**
Gradual changes in the overall application environment, such as pollution or bearing damage, can cause increased current consumption. Preventive maintenance can be planned and carried out so that faults such as those caused by an overload can be prevented.

**Temperature**
Corresponding sensors in the switchgear environment can provide information about the condition of the contacts. Warming of the ambient air can indicate that the switchgear is too heavily utilized. One remedy is to avoid simultaneous activations, if applicable. The temperature of the motor or machine can also indicate wear.

**Ground fault or insulation detection**
In isolated IT networks, faults can be detected in the motor or supply line.

**Underload/performance measurement**
Performance measurements on machines can indicate broken couplings, torn belts, slippage in the coupling bay, dry running of pumps, or fan filter contamination.

In addition, there is a series of special acquisition variables for specific components such as pumps and general sensors whose measured values are recorded via analog inputs.

In many cases, the analysis of the described acquisition variables depends on the user’s estimation.

---

**Erfassungsgrößen, die Siemens Schutz- und Schaltschrankgeräte zur Verfügung stellen können**

- **Contact erosion; end of service life**
- **Current detection**
- **Performance recording/power factor**
- **Number of starts/breaking current**
- **Number of operating hours**
- **Number of overload tripping operations**
- **Current limit/overload**
- **Maintenance timer**

**Devices for condition monitoring**

<table>
<thead>
<tr>
<th>Acquisition variables</th>
<th>SIRIUS compact starter 3RA6</th>
<th>SIRIUS motor starters for ET 200S</th>
<th>SIRIUS motor starter for ET 200pro</th>
<th>SIRIUS motor starter M200D</th>
<th>ECOFAST motor starter</th>
<th>3RW44 soft starter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact erosion; end of service life</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Current detection</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Performance recording/power factor</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Number of starts/breaking current</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Number of operating hours</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Number of overload tripping operations</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Current limit/overload</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maintenance timer</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

* RLT (Remaining life time) steht für Restlebensdauerüberwachung

For further information about industrial controls: [www.siemens.de/sirius](http://www.siemens.de/sirius)
### Overview of device functions

<table>
<thead>
<tr>
<th>Motor contactor with RLT</th>
<th>SIRIUS compact starter and infeed system for 3RA6</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Proven SIRIUS technology</td>
<td></td>
</tr>
<tr>
<td>• 3 sizes S6, S10, S12 (55 to 250 kW at 400 V)</td>
<td></td>
</tr>
<tr>
<td>• Can be used up to 60 °C without derating</td>
<td></td>
</tr>
<tr>
<td>• Long electrical service life</td>
<td></td>
</tr>
<tr>
<td>• Replaceable main current contacts</td>
<td></td>
</tr>
<tr>
<td>• LED display of the remaining life time of the main current contacts (60%, 40%, 20%)</td>
<td></td>
</tr>
<tr>
<td>• With 20% or less remaining life time, a message is sent via the AS-Interface</td>
<td></td>
</tr>
<tr>
<td>• Connection via AS-Interface</td>
<td></td>
</tr>
<tr>
<td>• Compact starter up to 32 A as direct and reversing starter, 45/90 mm wide</td>
<td></td>
</tr>
<tr>
<td>• Only one weld-free clearance, instead of circuit breaker, contactor and overload relay</td>
<td></td>
</tr>
<tr>
<td>• Electronic trip unit with wide setting range 1:4 (5 versions)</td>
<td></td>
</tr>
<tr>
<td>• Integrated overload function with differentiated error reporting</td>
<td></td>
</tr>
<tr>
<td>• Infeed system up to 70 mm² and 100 A</td>
<td></td>
</tr>
<tr>
<td>• Connection via AS-Interface</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIRIUS motor starters for SIMATIC ET 200S – The uniform system solution in IP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intelligent connection of distributed drives to the controller</td>
</tr>
<tr>
<td>• Protects, switches and monitors the motor and application</td>
</tr>
<tr>
<td>• Comprehensive monitoring functionality</td>
</tr>
<tr>
<td>• Parameterization via STEP 7 HW Config</td>
</tr>
<tr>
<td>• Fail-safe motor starters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIRIUS motor starters for SIMATIC ET 200pro – The uniform system solution in IP65</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intelligent connection of distributed drives to the controller, e.g. conveyor technology</td>
</tr>
<tr>
<td>• With integrated repair switch</td>
</tr>
<tr>
<td>• Electromechanical or electrical switching</td>
</tr>
<tr>
<td>• Degree of protection IP65 permits application-oriented setup without a control cabinet</td>
</tr>
<tr>
<td>• Protects, switches and monitors the motor and application</td>
</tr>
<tr>
<td>• Parameterization via STEP 7 HW Config</td>
</tr>
<tr>
<td>• Part of Safety Integrated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIRIUS motor starter M200D – innovative solution for distributed drive technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Degree of protection IP65 permits application-oriented setup without a control cabinet</td>
</tr>
<tr>
<td>• Protects, switches and monitors the motor and application</td>
</tr>
<tr>
<td>• Parameterization via STEP 7 HW Config</td>
</tr>
<tr>
<td>• Connection to AS-interface, PROFINET and PROFINET</td>
</tr>
<tr>
<td>• Little variance among all motor starter versions</td>
</tr>
<tr>
<td>• Manual operation and main switch are integrated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECOFAST motor starter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ECOFAST motor starters are components of a distributed system solution</td>
</tr>
<tr>
<td>• Complete motor feeders with a high degree of protection for direct mounting to asynchronous motors</td>
</tr>
<tr>
<td>• Standard interfaces for power supply and controller connections</td>
</tr>
<tr>
<td>• Comprehensive diagnostics at the component level</td>
</tr>
<tr>
<td>• Complete product range comprising electromechanical and electronic motor starters, soft starters and speed regulating rheostats</td>
</tr>
<tr>
<td>• Support for modular, flexible installation of motor applications for conveyor technology applications</td>
</tr>
<tr>
<td>• Connection to AS-i or PROFIBUS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3RW44 soft starter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Electronically controlled run-up and run-down of asynchronous motors</td>
</tr>
<tr>
<td>• Integrated jumper contact system</td>
</tr>
<tr>
<td>• Integrated motor overload and intrinsic device protection</td>
</tr>
<tr>
<td>• Adjustable current limiting</td>
</tr>
<tr>
<td>• Integrated status and fault monitoring</td>
</tr>
<tr>
<td>• Torque control</td>
</tr>
<tr>
<td>• Integrated braking function (superimposed DC braking)</td>
</tr>
<tr>
<td>• Compact design</td>
</tr>
<tr>
<td>• 5 sizes for the power range from 15 to 710 kW</td>
</tr>
<tr>
<td>• Recording the active power</td>
</tr>
<tr>
<td>• Connection via PROFIBUS</td>
</tr>
</tbody>
</table>
Monitoring and diagnostics for drive components

Hardly any other group of products influences plant availability as much as drive engineering: production stops if these systems fail. Such unplanned plant downtimes are associated with expensive production outages, unplanned repairs, and frequently consequential damage.

The drive systems and frequency converters of the SINAMICS, MASTERDRIVES and MICROMASTER ranges with the downstream motors are integrated into the SIMATIC Maintenance Station. This results in the common, uniform presentation of maintenance-relevant information which permits preventive and predictive maintenance strategies.

The drive systems are incorporated into the maintenance station using the engineering system Drive ES SIMATIC, an add-on package for SIMATIC STEP 7. Drive ES SIMATIC permits Siemens drives to be controlled, operated, monitored, and diagnosed using SIMATIC STEP 7 with standard function blocks.

Condition monitoring

The frequency converters offer multiple monitoring options such as speed monitoring, motor current monitoring, motor overload, torque monitoring by means of tolerance band checks and thermal motor monitoring.

Maintenance functionality

SINAMICS permits simple plant diagnostics, even via TeleService. For this purpose, all of the drive parameters including motor data are available.

The uncomplicated connection system allows simple replacement of components during maintenance, and a programming device is not required. The Control Unit can be replaced quite easily by replacing the integrated flash card. In addition, the entire power electronics can be replaced without requiring reparameterization. Diagnostics with an operator panel is possible on site.

Identical meanings of the parameters simplify the maintenance of different drive types. Many identical parts facilitate the simple stocking of spare parts, e.g. use of the CU 320 for SINAMICS S120, G130/G150, S150, GM150, SM150.

PROFIBUS/PROFINET interfaces are global standards, and the established transmission protocols are used (Ethernet/TCPIP).

Drives are integrated into the maintenance station concept using a Drive ES SIMATIC proxy block which provides the maintenance condition and links the drive with respect to the operating condition and maintenance requirements to the signaling system.

Products

Together with the proven frequency converters MICROMASTER and MASTERDRIVES, the SINAMICS drive family covers the complete range of applications, power and performance levels: Conveyors, fans, extruders and mixers, packaging and plastics machines, machines for production of food and beverages, presses and punches, printing and paper machines, etc. All drives can be managed using Drive ES.
Maintenance, based on the example of a conveyor belt

A geared motor drives a conveyor belt, and is controlled by a frequency converter. The frequency converter records the runtime of the geared motor using a runtime meter. In addition, the utilization is recorded through evaluation of the temperature and torque of the geared motor. The plant operator can then define the maintenance intervals based on the utilization. If the temperature and torque limits are not exceeded, the geared motor can then be serviced at shorter intervals. If there are frequent torque peaks/changes or overtemperatures on the geared motor, the maintenance intervals can be shortened.

Special procedures for assessing the state of high-voltage machines

An established procedure for assessing the condition of high-voltage machines is partial-discharge diagnostics (PD) which is carried out as an offline or online measurement depending on the application. This is an important measure within reliability-based maintenance strategies for large drives.

In order to measure the PD signals, as an option the patented Siemens Insulator Integrated Coupling Units can be installed in high-voltage motors at the factory.

The post insulators in the terminal box are simply replaced by the Insulator Integrated Coupling Units. This results in decisive benefits:

• Simple, low-cost installation
• No change in terminal box necessary
• Rugged mechanical design
• Highest rated and tested safety of insulation distances
• Direct interface to condition diagnostics

The frequency converters for controlling the speed, which are compatible with the high-voltage motors, also offer intelligent maintenance functions: Their components report autonomously that maintenance is required. For instance, by means of a differential pressure procedure the degree of contamination of the dust filters is determined. For liquid-cooled devices the analog conductivity measurement continuously monitors the operation of the ion exchanger and outputs an early-warning message when the exchange capacity decreases. This ensures that components are exchanged in good time (e.g. during a routine inspection).
Monitoring and diagnostics for drive trains

Although designers and plant engineers attach utmost importance to a long service life of drive train elements, sporadic disturbances during daily operation may occur as well as damages due to wear after many years of operation. Unscheduled downtimes and sometimes serious consequential damages can occur in many cases if the disturbances and damages are not detected in time.

Use of condition monitoring technologies and services

For this reason, Flender Service offers and uses various condition monitoring tools and services for machine status acquisition:

- Gear control diagnostics systems
- Drive analyzers
- Torque measuring technique
- SIPLUS Condition Monitoring Systems
- Oil analyzing systems
- Thermography
- Laser alignment systems
- Video endoscopy

Measurement of torques on the drive train

Many problems in electromechanical drive systems can be solved by using the torque measuring technique.

As a primary process variable, the torque best describes the loads on the components of a drive train. Usually, it is the highly dynamic vibration components in the torque signal that permit statements on impermissible resonant torsional vibrations or overload peaks.

To carry out the measurement, an appropriate part of the drive train, for example a shaft or coupling bush, is turned into a torque sensor by adhering foil strain gauges to the surface of shafts and connecting them as a Wheatstone bridge. The torsion-dependent surface expansion is transmitted to the strain gauge without loss. Flender Service has optimized the practical aspects through numerous applications such that the design of the complete measuring chain of a torque channel, from preparation of the shafts up to data recording, can usually be completed within one working shift.

Flender Service is a product division of Siemens AG.

www.siemens.com/flenderservice
Monitoring and diagnostics for machine tools

The aim of SINUMERIK Manufacturing Excellence is to increase the productivity and availability of machines and to optimize servicing and maintenance processes worldwide. Siemens software supports the two main processes representing the supporting pillars in modern and efficient production.

Total Productive Maintenance (TPM) to increase the machine service life

The TPM software informs the machine operator directly about preventive maintenance activities. A traffic light signalizes pending maintenance jobs in time. Brief instructions in the form of PDFs and HTML documents support machine operators in carrying out maintenance work. This can be implemented direct on the controller or PC in the technician's office.

Based on the TPM (Total Productivity Maintenance) philosophy, production and maintenance are both integrated in the maintenance and servicing activities.

The results:

- Maintenance department is relieved from simple routine jobs
- Less printed documentation is required at the machine
- Increase of overall plant effectiveness due to optimally maintained machines

Notification of pending maintenance activities

Condition Monitoring to prevent unscheduled machine failures

Software-supported, automated test routines regularly record and archive the actual machine status. By comparing the actual status to previous status measurements, changes in the machine can be identified. Based on these trends component failures can be predicted. This enables the machine manufacturer, maintenance staff or service provider to schedule maintenance activities such that they will be implemented during periods with no production. This reduces unscheduled downtimes to a minimum and increases the productive time of plants significantly.

A virtual team, consisting of machine manufacturers, maintenance staff and service providers has online access to the machines and trend analyses. Thus a platform is made available for uncomplicated cooperation.

The results:

- Safe communication between company networks
- Reduced inspection and maintenance overhead
- Reduced maintenance costs
- Reduction of the life cycle costs

Additional information is available in the Internet at:

www.siemens.com/sinumerik/manufacturing-excellence

➔ under HMI software
Monitoring and diagnostics for actuators, switching devices and sensors

The IO-Link standard is an innovative, standardized sensor and actuator interface extending the functionality of the fieldbus systems to the field devices. The IO-Link solution optimally integrates sensors and actuators below fieldbus level, complete with all their performance capability, into the Totally Integrated Automation (TIA) environment.

IO-Link – more than just another interface

IO-Link is the smart concept for the standardized linking of switching devices and sensors to the control level by means of an economical point-to-point connection. The new communications standard IO-Link below the fieldbus level allows central fault diagnosis and location as far as the actuator/sensor level and simplifies both commissioning and maintenance by allowing the parameter data to be modified dynamically, direct from the application. Improvements in the intelligence of field devices and their integration in the overall automation support data access down to the lowest field level. The result: Greater plant availability and reduced engineering expenditure.

SIMATIC ET200 distributed I/O provides the interfacing using proven flexible architecture. Two master modules with a high and standard degree of protection are available, and both guarantee easy IO-Link communication with sensors and actuators. The ET200S distributed I/O (IP20, control cabinet integration) offers the support of up to 64 IO-Link masters, the 4SI IO-Link serial interface modules. The robust expandable block version ET200eco PN with a high degree of protection (IP65/67) is available for PROFINET as the IO-Link master module. Both master modules, with 4 IO-Link channels each, support the connection of up to 4 IO-Link certified IO-Link devices. These include, for instance, module K20 for 4 or 8 binary sensors, and switching devices like the SIRIUS 3RA6 compact starter (direct or reversing motor starters).
The information provided in this brochure contains descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract. Availability and technical specifications are subject to change without prior notice.

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