

# SIMATIC WinCC flexible

Flexibility in any HMI application –  
from Micro Panel to PC

Brochure · August 2008



SIMATIC HMI

**SIEMENS**

# SIMATIC WinCC flexible

## Flexibility and security of investment

**SIMATIC HMI (Human Machine Interface) offers you a broad range of operator panels and PCs for all HMI tasks. Two families of software are available for configuration.**

### **SIMATIC WinCC flexible: Machine and process-level operator control and process monitoring**

SIMATIC WinCC flexible is the innovative HMI software under Windows for all machine level applications in machine, series-machine and plant construction. The range of operator panels extends from Micro Panels, that are designed for applications with SIMATIC S7-200 controllers, to on-site solutions with SIMATIC Panel PCs or PCs.

WinCC flexible stands for maximum configuration efficiency: Libraries with preassembled objects, reusable faceplates, intelligent tools extending to automated text translation for multilingual projects.

WinCC flexible Runtime provides basic HMI functionality on PCs, including alarming and logging systems, at an affordable price and can be expanded with options. The runtime functionality available on the SIMATIC devices depends on the respective class of device.

Concepts with "Sm@rtClients" and servers facilitate plant-wide access to tags and graphics, distributed operator stations as well as remote operation and diagnostics via the Internet – also in conjunction with SIMATIC Panels.

### **SIMATIC WinCC: Scalable process visualization**

For more complex PC-based applications in plant construction, the SIMATIC WinCC process visualization system is available. WinCC offers complete SCADA (Supervisory Control and Data Acquisition) functionality under Windows for all sectors. The range of applications extends single-user down to distributed multi-user systems with redundant servers and cross-location solutions with web clients. With the integrated process database (MS SQL server), WinCC forms the information hub for company-wide, vertical integration.

Thanks to the unique integration of Totally Integrated Automation you can take advantage of the unrivalled interaction of all of our products and systems – even across different generations. This means you are protecting your investments while taking advantage of future developments at the same time. As the core of Totally Integrated Automation, SIMATIC comprises a wide range of standardized products and systems.

The Human Machine Interface (HMI) is becoming increasingly important as a window to the process.

This brochure describes WinCC flexible Version 2008.



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# SIMATIC WinCC flexible – Basic System

## Visualization for SIMATIC operator panels and PCs

### Flexible in any application

WinCC flexible is ideal for use as a Human Machine Interface (HMI) in any machine or process-level application in plant, machine and series-machine construction. WinCC flexible is designed for all sectors of industry and offers engineering software for all SIMATIC HMI operator panels, from the smallest Micro Panel to the Multi Panel, as well as runtime visualization software for PC-based single-user systems running under Windows Vista / XP. The projects can be transferred to different HMI platforms where they can be executed without the need for conversion.

Thanks to multilingual software and projects, WinCC flexible can be used worldwide.

### SIMATIC WinCC flexible Engineering Software

WinCC flexible includes innovative engineering tools for the end-to-end configuration of all SIMATIC HMI devices and is available in a number of versions differentiated by price and performance. They are based on each other and are optimally tailored to the individual classes of operator panel. The larger software package always includes the configuration options of the smaller package.

- SIMATIC WinCC flexible Micro:  
Micro Panels
- SIMATIC WinCC flexible Compact:  
Same as WinCC flexible Micro plus  
Mobile Panels of the 170 series  
Panels of the 70 and 170 series
- SIMATIC WinCC flexible Standard:  
Same as WinCC flexible Compact plus  
Mobile Panels of the 270 series  
Panels of the 270 series  
Multi Panels of the 270 and 370 series
- SIMATIC WinCC flexible Advanced:  
Same as WinCC flexible Standard plus  
SIMATIC Panel PC  
SIMOTION Panel PC  
SINUMERIK Panel PC  
Standard PC

### SIMATIC WinCC flexible Runtime software

The runtime software is included in the SIMATIC HMI devices and offers different HMI functionalities and quantity structures depending on the hardware configuration of the device. For PC platforms there are WinCC flexible Runtime versions, sorted according to the number of PowerTags used (128, 512, 2048 or 4096).

The term PowerTags is used exclusively to identify variables (tags) that have a process link to the PLC. Tags without a process connection, constant limit values of tags as well as (up to 4000) alarms are provided as an additional system feature.

### Powerpacks

Power packs enable the number of usable PowerTags to be increased. If your application grows, WinCC flexible just grows with it. You can therefore easily start with the smallest version and upgrade with Powerpacks as the need arises. Powerpacks also offer you the opportunity of upgrading the engineering software, e.g. because you not only want to use Panels and Multi Panels (WinCC flexible Standard), but also PC-based solutions (WinCC flexible Advanced).



SIMATIC Panel PCs



SIMATIC Panels – Some examples

## Options

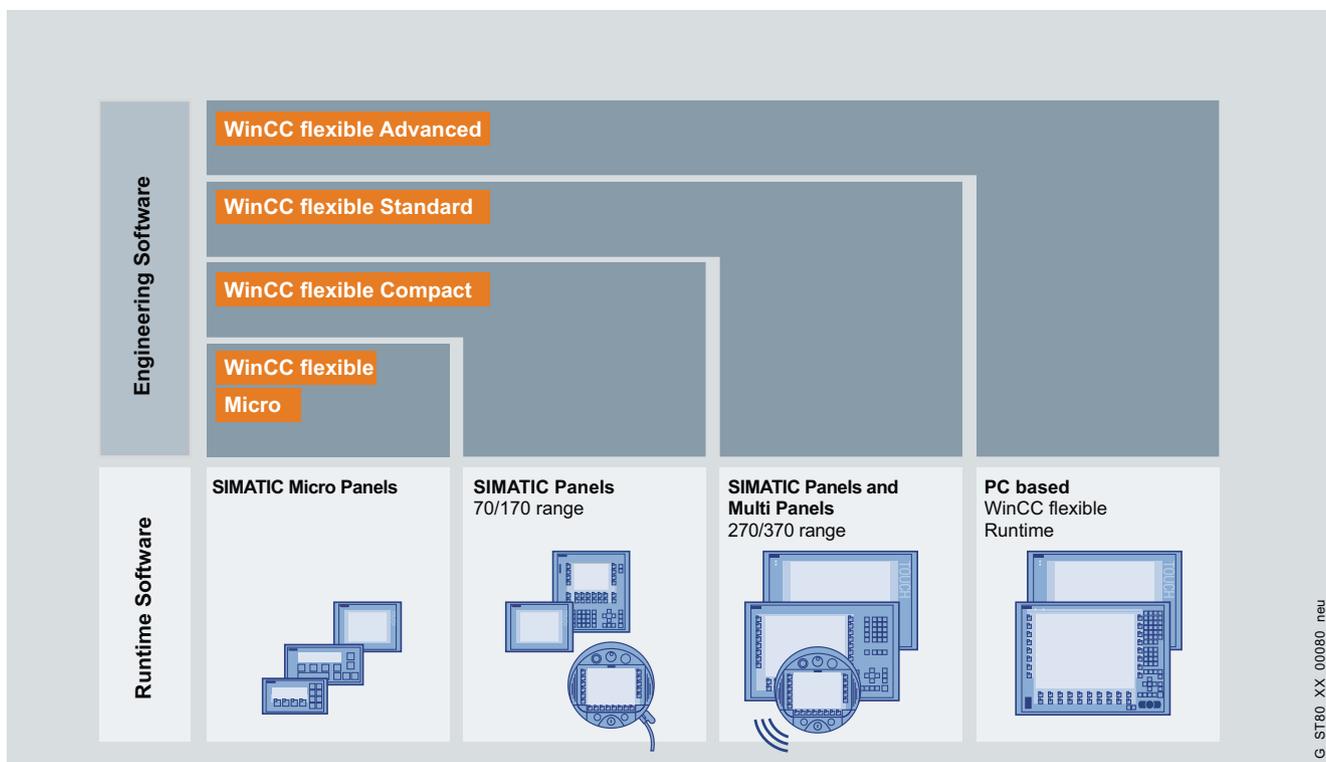
Functional or industry-specific expansions of the engineering and runtime software are available in the form of WinCC flexible options. Some options are already integrated as standard functions in some HMI devices, while others are only available above a certain class of device.

## Software updates

You can download hardware support packages for the configuration of new SIMATIC HMI devices, as well as service packs, free of charge from the Internet. On request and at a fixed price per installed WinCC flexible engineering system, you can be supplied automatically with all upgrades and service packs for a period of 12 months.

## Highlights

- For flexible use in the machine- and process-level area across all sectors and worldwide – thanks to multilingual software and projects
- Maximum configuration efficiency – e.g. by means of simple and convenient user interface, intelligent tools, user-friendly search and replace functions, simple handling of graphics and faceplate technology
- Innovative HMI and automation concepts: plant-wide access to process values and screens, distributed operator stations, networking of autonomous production cells, local control center solutions and links to the office world
- Service and diagnostics over the Internet: HMI, diagnostics and automatic e-mail notification
- Validation support in engineering and runtime: Tracing of manufacturing processes via audit trails, versioning and user management
- Protects your investments and is future-proof, thanks to compatible transfer of projects from SIMATIC ProTool



WinCC flexible – Engineering software and target systems

## Flexible use in the machine and process-level area

### Component of Totally Integrated Automation

Thanks to the unique integration of Totally Integrated Automation you can take advantage of the unrivalled interaction of all of our products and systems – even across different generations. Thus you protect your investments and simultaneously take advantage of future developments.

Totally Integrated Automation reduces engineering and life-cycle costs. For example, WinCC flexible directly accesses the tags and signal configuration of the SIMATIC controllers and also uses their communication parameters. This dispenses with time-consuming multiple entries and sources of error from the very beginning. In addition, the integrated diagnostics functionality supports maintenance during operation.

As a component of Totally Integrated Automation, WinCC flexible is ideally suited to the operator control and process monitoring of SIMATIC controllers. In addition, drivers are available for PLCs from other vendors.



### Coupling options

- to SIMATIC S7 via PPI, MPI, PROFIBUS DP and PROFINET (TCP/IP),
- to SIMATIC S5 and SIMATIC 500/505 (not under MS Vista)
- to SIMOTION and SINUMERIK,
- Drivers for PLCs of other leading suppliers, e.g.: Uni-Telway (Telemecanique) or Ethernet/IP (Allen-Bradley)
- as well as cross-vendor communication via OPC

ensure the correct interface in the widest variety of automation solutions.

WinCC flexible supports PROFINET, the innovative standard for industrial communication from field level to plant management level. Time-critical inputs via direct keys or a hand-wheel on the HMI devices can be performed in real time via PROFINET IO.

Multilingual engineering software provides the best conditions for the global use of WinCC flexible. Projects can be set up in as many as 32 languages simultaneously, of which as many as 16 (depending on device type) can be switchable online.

Machine and plant constructors who export worldwide also benefit from the Web-based service concepts.

# Maximum configuration efficiency

## Simple and user-friendly interface

The engineering software is based on the latest software technology (e.g. Microsoft .NET) and is currently available in German, English, French, Spanish and Italian, as well as in Chinese (simplified), Taiwanese (traditional Chinese), Korean and Japanese.

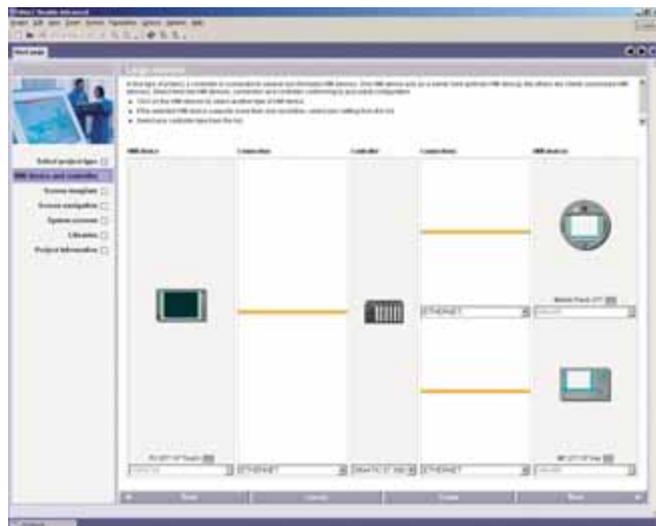
The software contains a series of editors and tools for different configuration tasks. You can configure, for example, in level technology using 32 screen levels. For the configuration of displays, various convenient functions are available, such as zoom in/out, rotate and align. In WinCC flexible you can set up your working environment according to your needs. In the engineering, a working environment oriented toward the respective configuration task appears on the monitor of the configuration computer. Here you will find everything you need to make your work more convenient:

- the project window for displaying the project structure (project tree) and for managing the project,
- the toolbox with various objects and access to the object library,
- the object window for the selection of objects already created (e.g. copying into the display by dragging and dropping),
- the work area, in which the displays can be created (layout and animation),
- the properties window for the parameterization of the objects in the work area.

## Intelligent tools for efficient configuration

SIMATIC WinCC flexible provides you with a whole series of intelligent tools for efficient configuration.

The **Project Wizard** for example enables you to create a basic project with navigation and system screens with minimal user input. In various dialog boxes

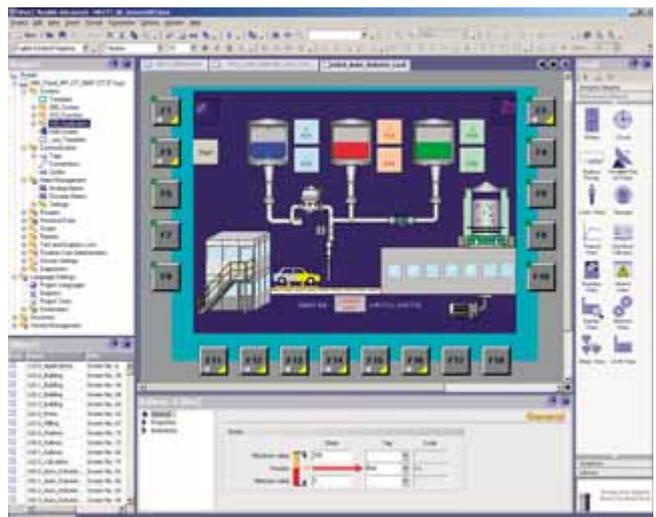


*Configuring with the Project Assistant*

You are guided through the navigation, select the required objects and have the project created at the touch of a button.

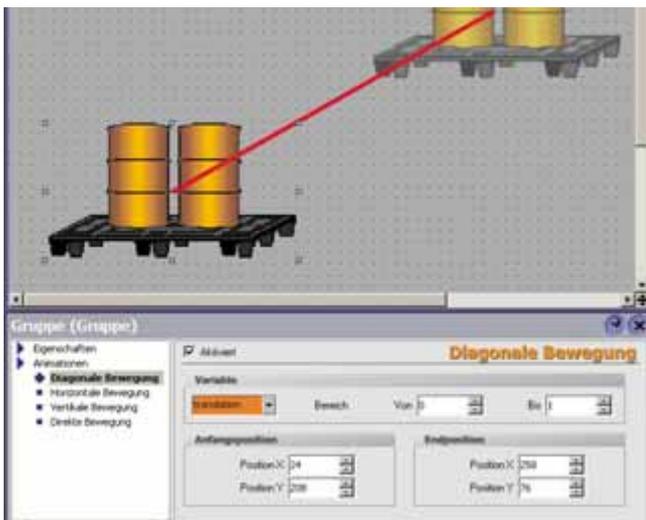
It goes without saying that, if necessary, you can also make subsequent manual changes to the settings that have been made initially with the project wizard.

More complex configuration tasks such as the definition of motion paths of display objects or the setup of the display hierarchy or operator prompting system are simplified by means of graphical configuration.



*WinCC flexible Advanced – the clarity of task-oriented windows*

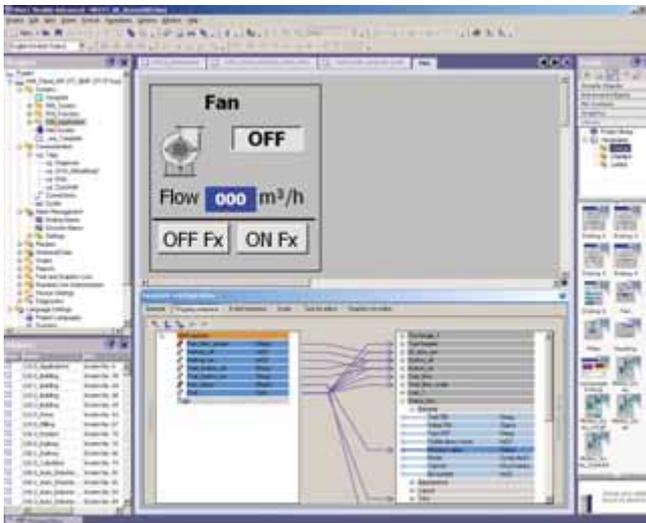
## Engineering – convenient, efficient, flexible



Configuring a motion path

Convenient configuration of a motion path: The motion path for a screen object comprises the start point and the end point, which you can simply determine using the mouse. You then assign a tag to this motion path. At runtime, the tag value then determines the relative position of the object on the motion path.

Table-based editors simplify the generation and processing of similar types of object, e.g. for tags, texts or messages. You can exploit the advantages during configuration of a host of objects, e.g. when creating and editing tags. If you create a number of tags with process links that are set up consecutively in the memory of the PLC, you can have the address area incremented automatically for each tag. You can, however, also change identical settings for several tags at once, e.g. the tag type or the connection.



Interconnection dialog for faceplates

User-friendly search and replace functions allow project-wide searching for objects, centralized rewiring of tags and the searching and replacing of texts. In addition, the cross reference list permits direct access to all objects in the project.

All configuration data can also be compiled and printed out conveniently in one project document.

The handling of graphics in different formats is very easy. Supplied graphics and the user's own screens can be displayed by means of a graphics browser and integrated into the project display by means of a drag-and-drop function. If a picture is to be edited, the associated external editor is started automatically. The placing of objects by dragging and dropping in the work area generates a graphic display in the open window or permits the labeling of a button or softkey.

### Reusable blocks get the job done faster

WinCC flexible already has a large number of scalable basic and extended objects and graphics, that can also be dynamized and that you can use in your displays. The supplied symbol library, for example, contains a host of general and industry-specific illustrations in various shades of color.

In addition, you can assemble faceplates from simple graphic objects on a project-specific basis and store them in a library. The dynamic properties of the graphic elements of a faceplate, such as shape and visibility can be interconnected with tags. This means, for example, at runtime it is possible to show or hide individual graphic elements of the faceplate, but also the complete faceplate, depending on a tag value. You can make changes to these faceplates from a central location. The faceplate is then automatically changed in all displays of the project in which it has been used.



Faceplates can be used without any need to spend a lot of time wiring them, if they are linked with structured data types. If this faceplate is used in a screen, a structure tag of the same type must be assigned to the faceplate for the complete connection.

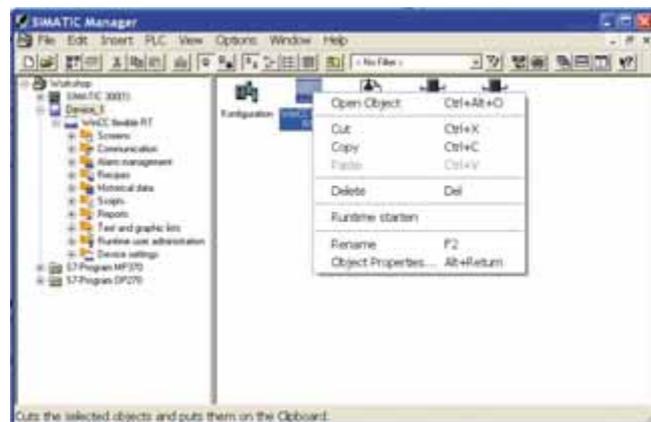


# Engineering – Integrated in automation systems

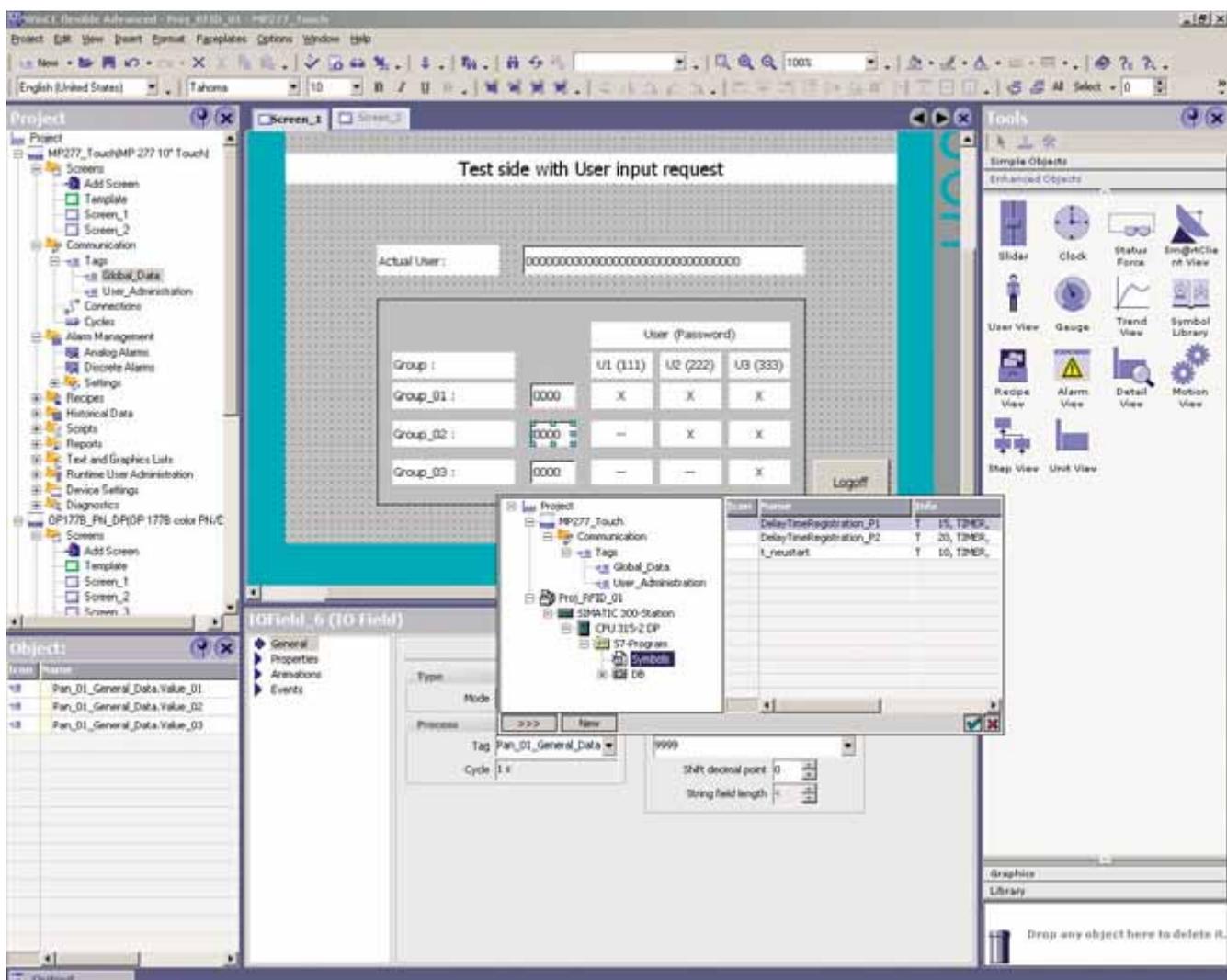
## Integration in SIMATIC STEP 7

Thanks to the integration into the configuration interface of SIMATIC STEP 7, WinCC flexible projects can be managed within STEP 7 and communication settings and tags and alarms can be shared. This significantly reduces the frequency of errors and ultimately leads to lower configuration costs.

In the integrated application case the project is managed by means of the SIMATIC Manager that is a component of STEP 7. By means of the SIMATIC Manager, you have access to all objects of WinCC flexible. You can, for example, create, copy or delete HMI devices, but also individual HMI objects such as graphics or recipes. During configuration, you have direct access to the STEP 7 symbols and data blocks that you have defined when creating the control program. This means it is no longer necessary to define process tags within WinCC flexible.



WinCC flexible integrates into the SIMATIC Manager

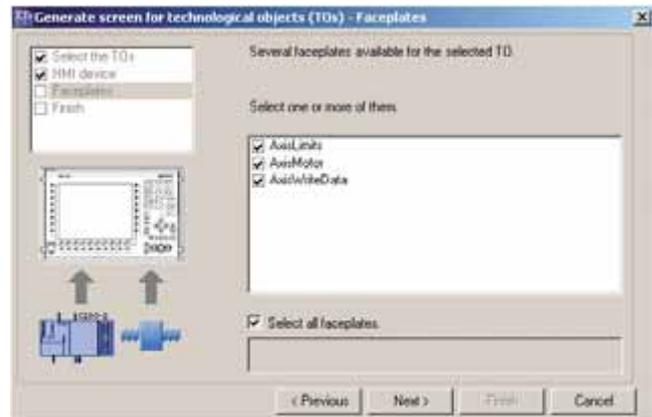


Access to the STEP 7 symbols from WinCC flexible

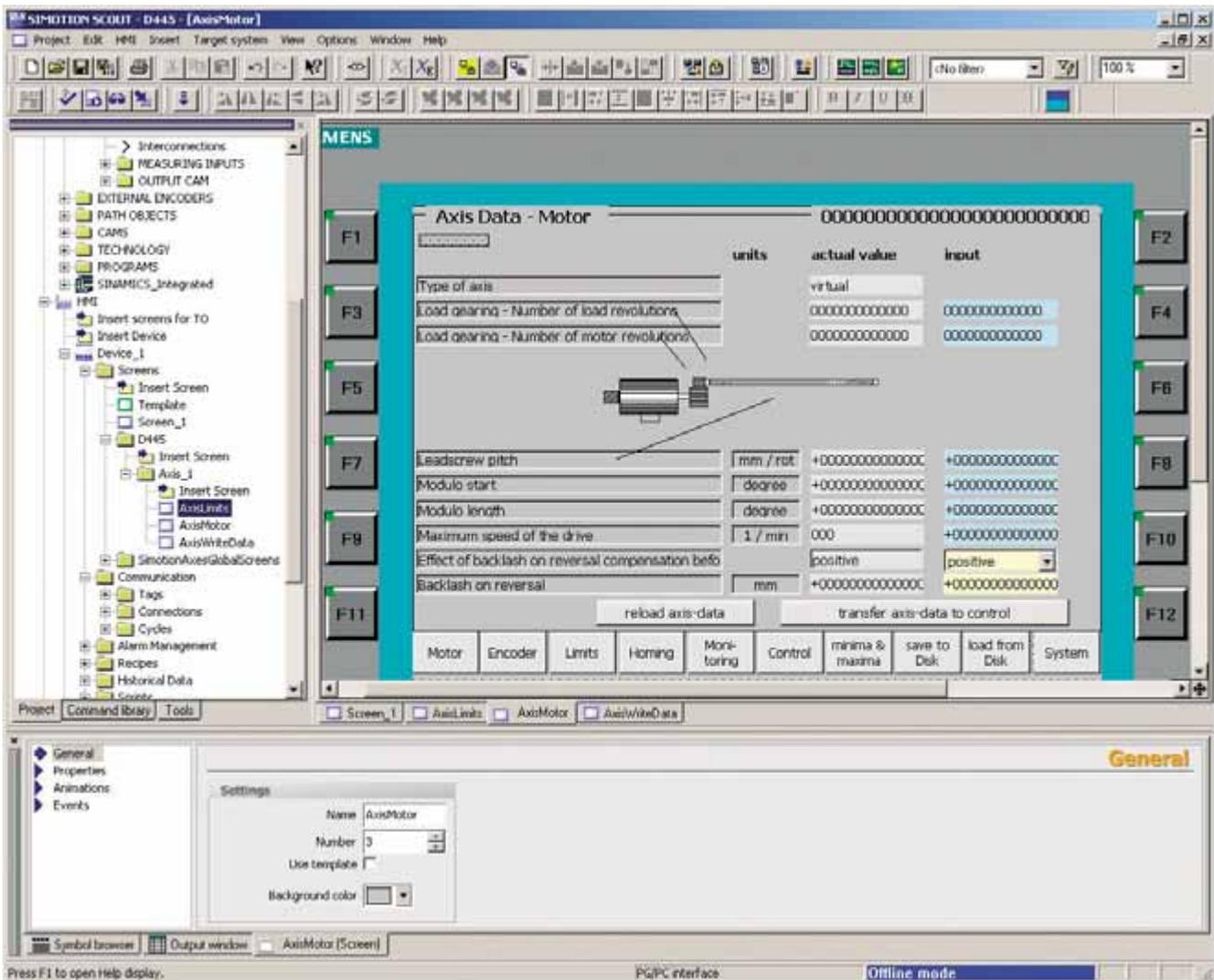
## Integration in SIMOTION SCOUT

Based on an innovative system approach, in which control tasks (typically logic functions), motion control functions and technology functions are combined, SIMOTION is an optimized system platform for the automation solutions of machines in which motion control and technology tasks take center stage. The motion control system consists of the engineering system SCOUT, the motion control technology packages and a common runtime system for the different SIMOTION platforms.

Integration of WinCC flexible into SIMOTION SCOUT offers the same benefits as integration into SIMATIC STEP 7, and complete integration into the SIMOTION SCOUT user interface as well as the automatic generation of process images depending on the configured technological objects. For example, this could involve axis screens for manual operation of axes configured for a machine.



Prefabricated faceplates



Integration of WinCC flexible in SIMOTION SCOUT

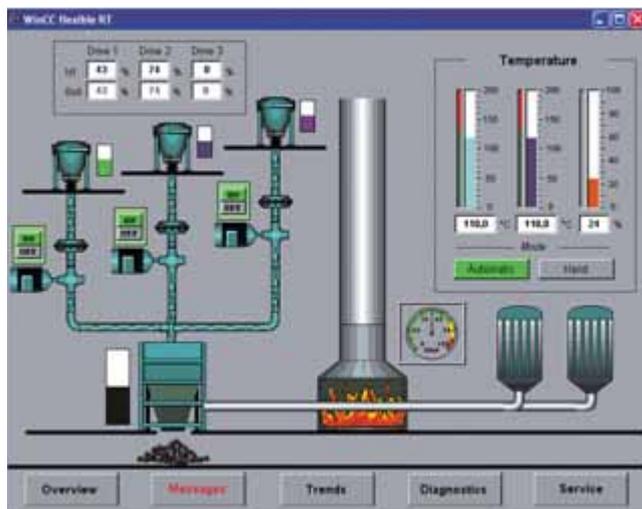
# Runtime functionality

## Basic functions and options

The runtime functionality is determined by the features of the HMI device used, such as available memory capacity or the number of function keys and can be extended by means of options. Some options are only available for panels above a specific class, while others are integrated. SIMATIC WinCC flexible runtime is available as a standalone product for PC platforms. The software offers every option for machine-level operator control and process monitoring

- User administration and access protection (user groups, code words, authorizations)
- Central plant-wide user management (option)
- Windows-compliant user interface with language support
- Process presentations with vector graphics, I/O fields, bar charts, trend displays etc.
- Alarm logging system with open alarm classes, acknowledgment and archiving
- Reporting system (shift, batch and alarm logs)
- Visual Basic Script for user functions
- Logging of alarms and process values (option)
- Recipe management (option)
- Sm@rt client/server concepts (option)
- Service and diagnostics over the Internet (option)
- OPC server communication (option)
- Process diagnostics (option)
- Reporting and tracing of operator actions (option)

Due to the individually traceable system functionality, with WinCC flexible you only pay for exactly the functionality that you require for performing the current HMI task. The grading of systems by the number of required PowerTags 128, 512, 2048 or 4096 creates particularly attractive entry-level prices. You can, moreover, extend the runtime functionality flexibly at any time by means of Visual Basic scripts. VBScript is a component of the WinCC flexible engineering software.



WinCC flexible Runtime – Burner representation

## User group and access protection

Access protection can be activated, if required. This enables you to set up user groups with specific rights. To perform certain operations, users must log in to the HMI system with their user ID and password. Further functions of user administration are time for automatic logout, password aging and the disabling of users by the administrator. Thanks to the integration into the central, plant-wide user administration with SIMATIC Logon, WinCC also covers the requirements according to FDA 21 CFR, Part 11.

By means of the option WinCC flexible/Audit, all relevant changes of tags and any operator inputs are recorded as audit trails.

## Language support for multilingual projects

Texts and graphics can be configured on a language-dependent basis. The project can contain up to 16 online languages (including Asian and Cyrillic texts). You can then switch between these languages at runtime. Different users can therefore select the language setting best suited to them. And if the exporter of a machine or plant is also responsible for service and maintenance, the service personnel can switch, if necessary, from an Asian ideographic language to English, for example, if it is correspondingly configured on site.

## Operating and display options

What options are available to the operator of a machine or plant depends on how the project has been created and what functionality the HMI device has. This functionality is made available to the user by means of a host of configured graphic objects on the user interface. WinCC flexible Runtime can be operated with the keyboard, mouse or touch screen, depending on the HMI device used.

Visualization for WinCC flexible is performed using a Windows-compliant user interface which comprises parameterizable variable objects as well as technological variable blocks:

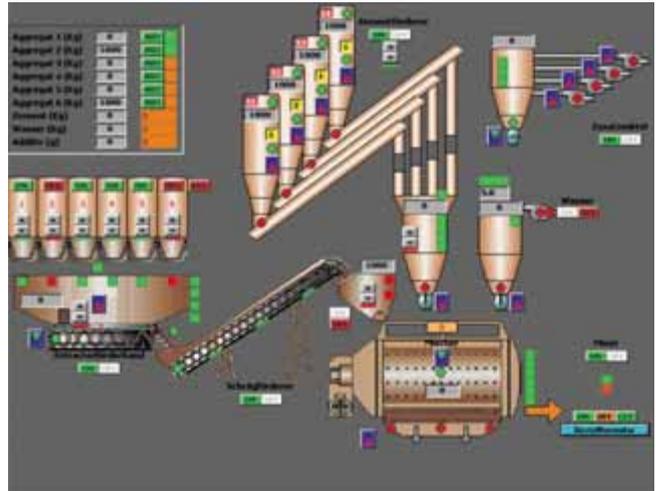
- Static texts and graphics (vector graphics)
- Graphic displays for various standard graphic formats (e.g., bmp, jpg, wmf)
- Buttons, switches and slide switches for operator-process communication
- Date/time fields
- Numeric and alphanumeric input/output fields
- Symbolic and graphic input and output fields
- Status fields/fields for adjusting variables of the control
- Dynamizable graphics from the symbol factory
- Bar charts and indicator instruments
- Trend display with scroll and zoom function as well as read line
- Alarm display, alarm window with operator controls, alarm indication
- Recipe views
- Sm@rtClient displays and HTML browser for plant-wide representation of tags and screens
- Technological variable blocks created from basic objects of the system

## Interrupts and messages

The alarm system immediately indicates events and states on the HMI device which have occurred in the system, in the process. Alarm events can be logged on a printer or saved in the alarm log (Archives option) for further processing and evaluation.

WinCC flexible makes a distinction between:

- User-defined alarms that indicate process states or record and log process data from the PLC on the HMI device
- Pre-defined system alarms that indicate specific system states of the HMI device or the PLC



WinCC flexible Runtime – Cement manufacture

User-defined alarms can be created in WinCC flexible in three ways:

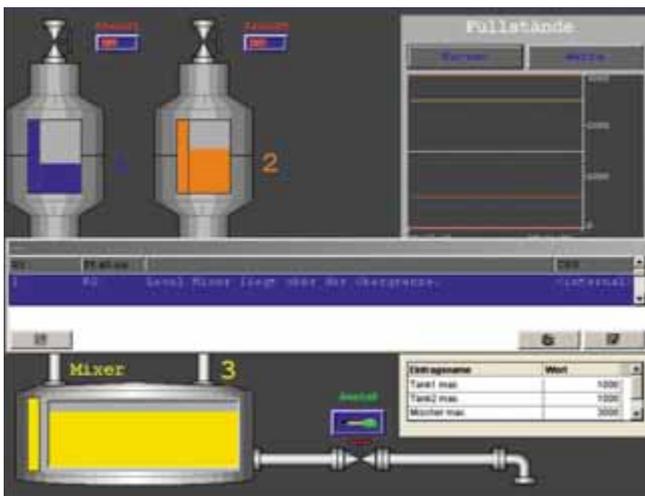
- Discrete alarms
- Analog alarms
- Alarms via message frame alarm procedure Alarm\_S/Alarm\_D for SIMATIC S7.

Alarms can have the status "Incoming", "Incoming/Acknowledged", "Incoming/Outgoing" or "Incoming/Outgoing/Acknowledged". WinCC flexible distinguishes between various acknowledgment mechanisms, so that not only the operator, but also the PLC can acknowledge alarms.

"Fault", "Operation" and "System" are predefined alarm classes with specific properties. For many applications, this classification is already sufficient. User-defined alarm classes can be used to define acknowledgement functions and the individual visualization of alarm events.

For the display of alarms on the monitor, you can use configurable alarm displays that in extreme cases only contain one line, or an automatically displayed alarm window. Configurable alarm filters can be set, which specifically restrict the current alarms to be displayed during operation. The filter acts on the user text in the alarm and can be a fixed character string or can be set dynamically by means of a tag. The alarm indicator signals to you that an alarm is waiting.

## Runtime functionality



Hybrid system with alarm window showing

### Reports

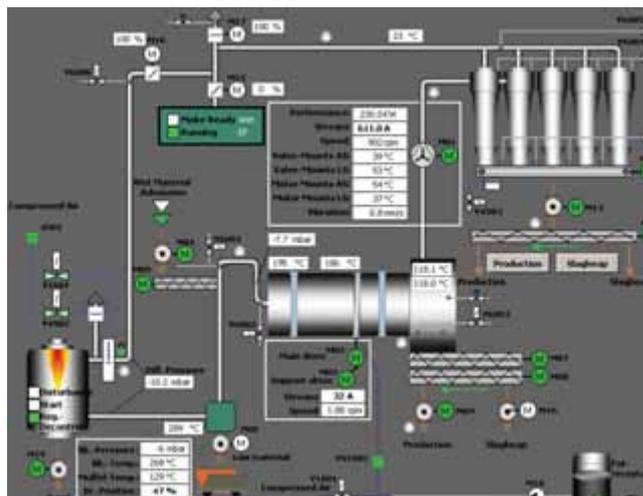
In WinCC flexible, reports are used to document process data and completed production cycles. You can report alarms and recipe data in order to create shift reports, output batch data, or to document a manufacturing process for the acceptance test.

You can create separate report files for reporting different types of data. You can set the triggering of the output separately for each report file. You can choose to trigger the output of data at a specific time or in defined intervals, or by other events. In this way, these features allow you to explicitly configure reports for different requirements. You can design the layout with complete freedom.

### Process communication

Drivers for the different system links to Siemens controller series and automation systems and to controllers from other vendors are included in the scope of delivery of WinCC flexible (see Technical Data on page 27). In addition, an OPC client is available for PCs. As every controller manufacturer also offers suitable OPC servers for their hardware, hardly any limits are set to the possible links in connection with WinCC flexible. WinCC flexible Runtime allows the use of the OPC client channels in parallel with any controller connection (multi-protocol capability).

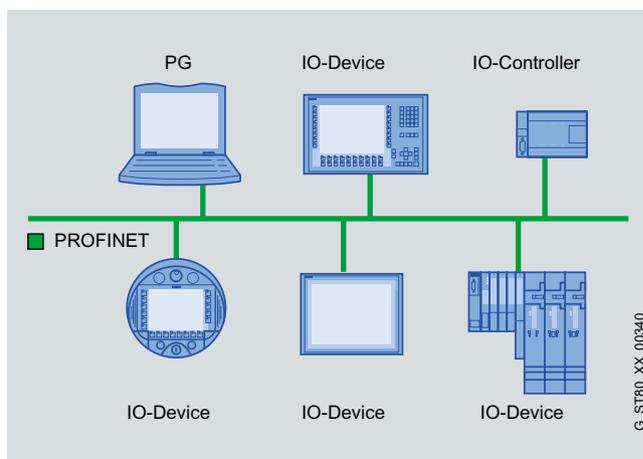
SIMATIC Panels with 177 series devices (color versions) or above, multi panels and PCs with WinCC flexible Runtime can also be linked to the PLC via PROFINET. The relevant SIMATIC HMI devices already have the appropriate interfaces on board.



WinCC flexible Runtime – Timber industry

PROFINET is based on Industrial Ethernet and uses the TCP/IP standard for parameterization, configuration and diagnostics. Real-time communication for the transmission of useful-process data is performed on the same cable. Distributed field devices (I/O devices, e.g. HMI devices) can be integrated into Industrial Ethernet either directly or via "I/O controllers" (PROFINET IO).

SIMATIC HMI devices of the 177 and 277 Class as well as the Multi Panel 377 support PROFINET IO. This means that time-critical operations, such as those performed with the DP direct keys via PROFIBUS, are now also possible on the basis of Industrial Ethernet (direct keys on the panels from TP/OP 177B and above, as well as handwheel on Mobile Panel 177/277).



Panels as I/O devices on PROFINET

# SIMATIC WinCC flexible – options

## WinCC flexible/Archive – Logging process data and alarms

Logging process data and alarms with WinCC flexible/ Archives supports the acquisition and processing of process data from an industrial plant or machine. An evaluation of the logged process data then provides information on the operating status during the industrial process (production, processing, process etc.). Process sequences can be documented, the capacity utilization or the production quality can be monitored or recurring fault conditions can be logged.

In WinCC flexible, you can select from the following logging options:

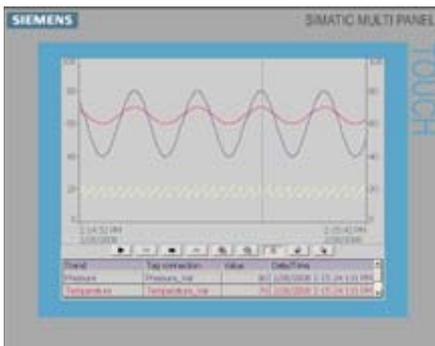
- Circular log
- Segmented circular log
- Circular log which triggers a system alarm depending on how large it is
- Circular log which executes system functions when it is full.

### Trend views

For the layout and evaluation of logged process data, you can use a configurable trend view in your images. A reading line makes the values easier to read.

Trends views can be provided with different values depending on the configuration:

- Archive: for displaying the logged values of a tag
- Real-time pulse triggered: for time-triggered display of values
- Real-time bit triggered: for event time-driven display of values
- Buffer bit triggered: for event-driven display with buffered data acquisition



*Trend display by means of configurable trend views*

### Benefits

- Early detection of danger and fault conditions
- Avoidance of downtimes by means of predictive diagnostics
- Increase in product quality and productivity due to regular evaluation of log

### Logging and evaluation of process data

The values from external and internal tags can be saved in process data logs. You can individually specify the log in which each tag will be saved. Configured logging cycles are used to ensure continuous acquisition and storage of the tag values. In addition, data logging can also be triggered by events, e.g. when a value changes. These settings can be made for each tag individually. In process operation, the tag values which are to be logged are captured, processed and stored in an ODBC database (e.g. Microsoft Access, only for PCs) or a file. Depending on the hardware configuration of the HMI device, the data may be logged locally (on the hard disk of the PC or on the storage card of a panel) or, if present, on a network drive. Saved data can undergo additional processing in other programs, e.g. for analysis purposes.

### Alarm logging

WinCC flexible also lets you log alarms and document operational states and error states of the industrial plant. All alarms of an alarm class are stored in the same alarm log, enabling you in principle to assign the same log to several alarm classes. Alarms can be logged automatically or managed by an operator. The logged data can be stored either in an ODBC database (only for PCs) or a file. The entire functional scope of the database is available for additional processing and evaluation of log data.

## WinCC flexible/Recipes – Administration of data records in recipes

### Benefits

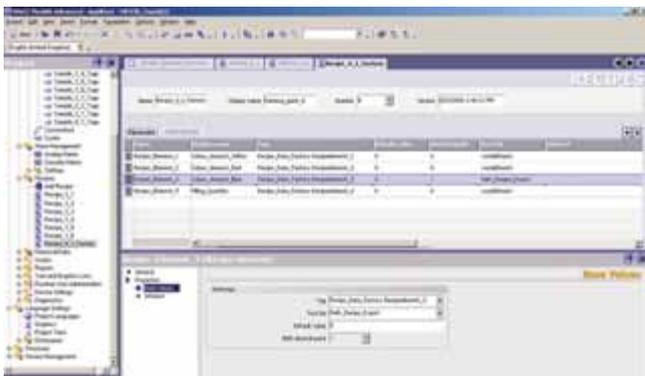
- Simple transmission of recipes to the PLC
- Clear tabular display of the data elements
- Display in technological contexts across several process images
- Export/import of data records for further processing with other tools (e.g. MS Excel)

WinCC flexible/Recipes is used for managing data records in recipes which contain associated machine or production data. The data in a data record can be transferred, for example, from the HMI device to the PLC to switch production to a different product variant. Recipes are frequently used to assign parameters for plants or machines in the production industry, in particular however in the context of batch production in the food and beverage or plastics industry.

### Pre-assignment of recipes

In the case of WinCC flexible, you can conveniently create the recipes and the associated data sets and assign data to them by means of a special editor. You can input the data in the following ways:

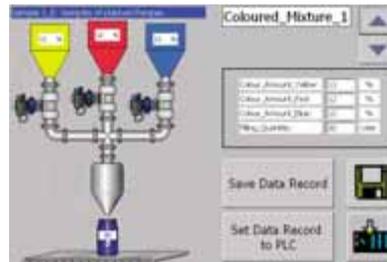
- Input of data in the process operation
- Import of the data in runtime (e.g. by means of a CSV file)
- Data entry during configuration



Recipes – Pre-assignment of data records during configuration

### Display and management of recipes at runtime

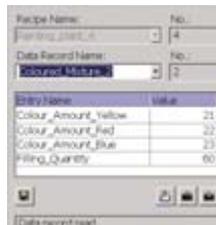
A configurable table object is used for displaying and managing the data at runtime. If necessary, you can also display the individual data record elements directly as standard input/output fields across several process images. In this way, the data in technological views can be presented clearly to the operator.



Recipe display

### Data exchange with the PLC, storage and logging

The data record elements are linked to the process by means of a direct tag connection with tags in the PLC. The data records can be transmitted in both directions, i.e. specifications of the operator stations result in operating data from the PLC. Powerful interfaces enable a synchronized data exchange with the PLC. The data records themselves can be stored on local data carriers and can be imported and exported in CSV format on request. In order to retain individual production and process sequences, you can document the data records in the form of a batch or shift log.



Recipe display

## WinCC flexible/Sm@rtAccess – Innovative HMI concepts

### Innovative concepts

- Local operator station with plant-wide access to tags, e.g. networking of autonomous production cells
- Distributed operator stations for controlling large machines that are spread out over a large area
- Local control center solutions with possibilities for central logging, analysis and further processing of process data
- Interfacing to the office world

### Simple client/server mechanisms

The WinCC flexible/Sm@rtAccess option provides simple client/server mechanisms for panels and multi panels above OP/TP 177B (color versions), as well as PCs with WinCC flexible Runtime:

- Display and operation of screens via the Sm@rtClient concept
- Communication between HMI stations via the SIMATIC HMI HTTP protocol
- Web service (SOAP) for access to tags from external applications by means of VBA macros (not with MS Vista)

Within the scope of the Sm@rtClient concept, a station can make its images accessible to another station. It then assumes the function of a Sm@rtServer, while the other station assumes that of the Sm@rtClient. The server function can be activated quite simply with a mouse-click when making the device settings. The screen can be displayed on the Sm@rtClient by means of a Sm@rtClient display in "View only" mode, but a full-fledged, coordinated operator console can be set up as well.

### Benefits

- Flexible solution for access to process data and operator stations from any location
- Simple and quick configuration of "communication relationships" between HMI devices
- Reducing the load on the field buses by means of TCP/IP communication between operator stations

"Coordinated operation" implies that at any one time only one station has the right of operation, i.e. either the operator station with Sm@rtServer function or that with the Sm@rtClient function. Depending on the basic hardware, a Sm@rtServer can supply up to 5 clients simultaneously with updated process images (for PCs and panels it is a maximum of 3 clients), whereby one channel should always be reserved for service purposes (see Sm@rtService option).

In communication via the SIMATIC HMI-HTTP (Hyper Text Transfer) protocol, HMI stations have read and write access to each other's tags. The station that makes its tags available to another station assumes the function of an HTTP server, while the others assume that of an HTTP client. The server function in turn can be activated with a mouse-click during configuration. The connections on the client are configured in the same way as those to a PLC. At runtime, one Panel or Multi Panel can manage up to 8 HTTP connections, while PC systems can even manage up to 16.

In both cases, operating stations can be both server and client at the same time, in which case each station requires its own license. Communication is by means of TCP/IP, i.e. via PROFINET or Intranet/Internet.

The read/write access to tags is also possible for standard external applications such as Microsoft Excel. This access takes place via the overlaid Simple Object Access Protocol (SOAP) and a VBA script embedded in the application (not with MS Vista).

The data exchange between operator stations themselves and between operator stations and higher level systems based on PROFINET relieves the load on the field bus, as process tag values that are required several times only have to be requested once by the PLC from an HMI station via the field bus and can then be forwarded to several "interested clients" via PROFINET or Intranet/Internet. Altogether, a number of innovative concepts are created for HMI and automation tasks.

### Distributed operator stations

The operation of large, physically distributed machines and plants becomes easier, because distributed operator stations can be configured by means of the Sm@rtClient concept, so that the operator can control and monitor from various locations – while only needing to configure one time. Changes to the configuration therefore only have to be performed once on the Sm@rtServer. The operator can see the same display on every operator station, although only one station can be operated at any one time (coordinated operation).

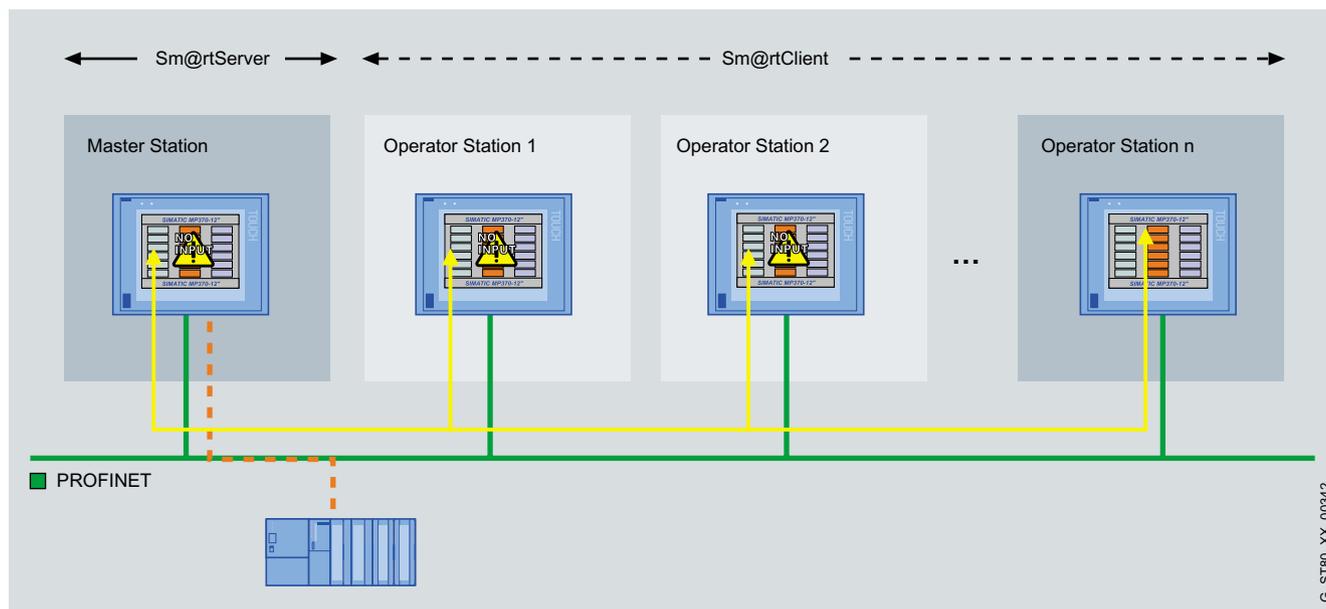
## WinCC flexible/Sm@rtAccess – Innovative HMI concepts

### Networking of autonomous production cells

The plant-wide read and write access to tags makes it possible, for example, to exchange data easily between individual, originally autonomous sections of a production process (i.e. automation units).

Application example:

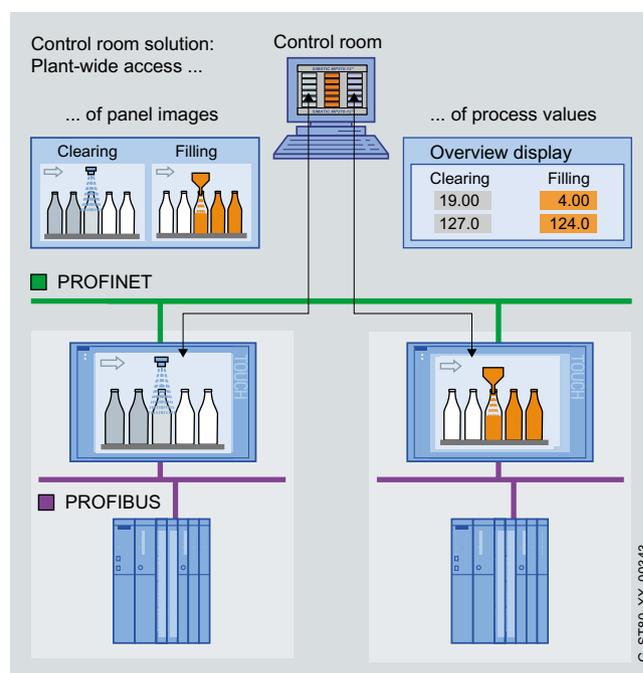
- Automatic initiation of the filling process, as soon as the cleaning process is complete
- Warning to the cleaning, filling and labeling station if the packing station cannot accept any more bottles due to a fault



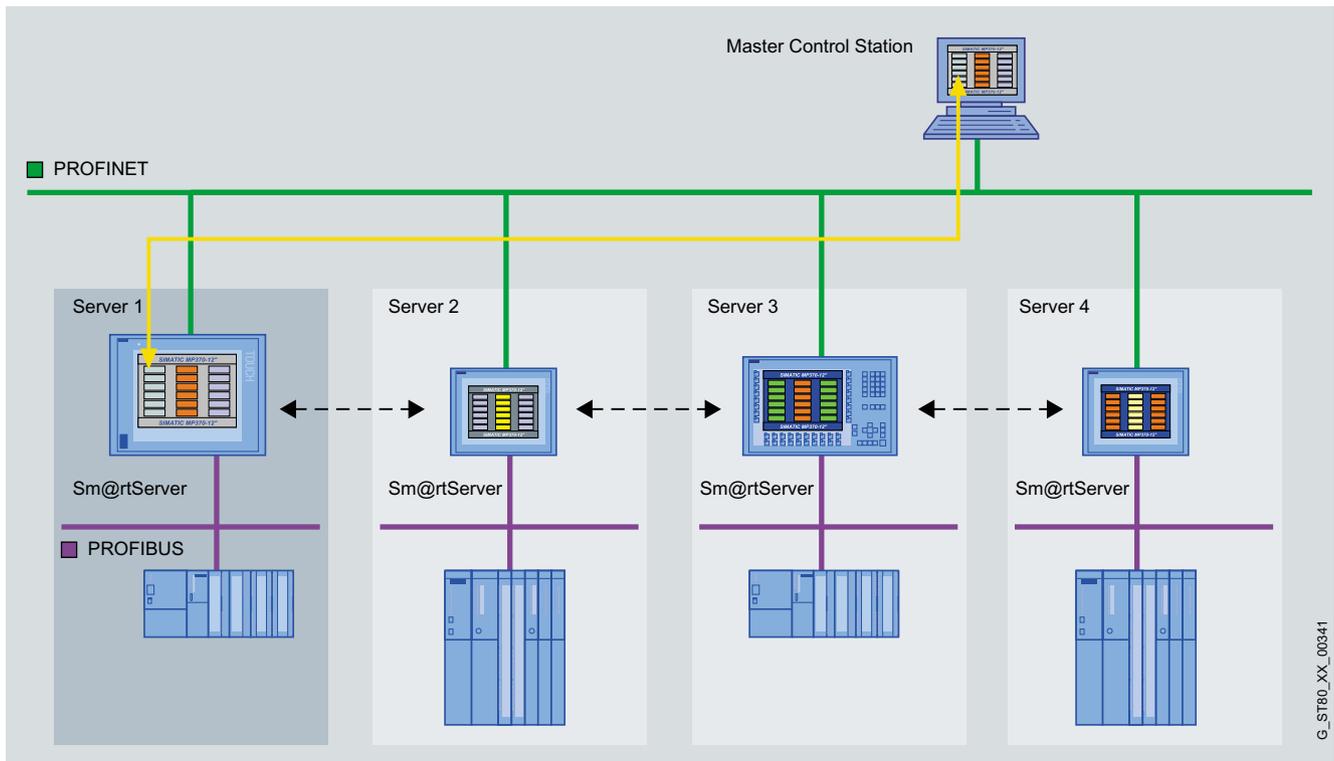
Sm@rtAccess – Distributed operator terminals on a machine covering a large area (function scheme)

### Local control center solutions

The plant-wide access to tags and screens even allows cost-effective, local control room solutions to be set up. This means that important process data from the on-site operator station (server) can be displayed on a higher-level head station (client) and also controlled centrally if required. If a PC is used for the head end, options are also available for archiving, analysis, and further processing of acquired process data.



Sm@rtAccess – Control center solution with central access to tags and screens



Sm@rtAccess – Control center solution with switchable view to on-site stations (Sm@rtClient display)

### Interfacing to the office world

The opportunity for data exchange by means of tags also exists between WinCC flexible and office applications, such as Microsoft Excel, using a corresponding (Excel) script. In this way you can perform analyses and statistical calculations with a standard tool and also derive specifications from it for optimizing the production.

Further options for connection to higher-level systems (SCADA systems, production management systems, ERP applications) for further processing are available when using the WinCC flexible/OPC server (cf. p. 20).

## WinCC flexible/OPC Server – Cross-vendor communication

### Benefits

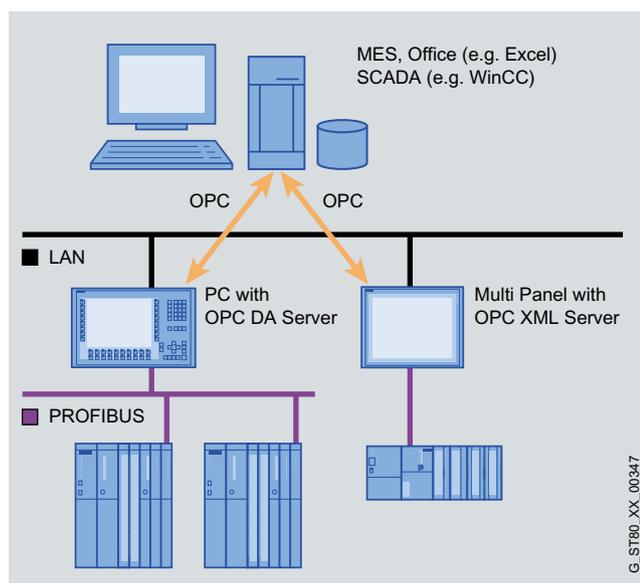
- Incorporation of automation components from different vendors into a single automation concept
- Saving of development costs by using standardized communication
- Reduced load on the field buses

OPC (Openness, Productivity, Collaboration) describes a standardized, open and cross-vendor software interface. OPC is based on the Windows technology of COM (Component Object Model), DCOM (Distributed COM) or on XML (Extended Markup Language).

In connection with the SIMATIC WinCC flexible/OPC Server option, you can use Windows-based systems, such as SIMATIC Panel PCs with WinCC flexible Runtime or SIMATIC Multi Panels, for machine and process-level tasks and at the same time set up communication to OPC-capable applications via Industrial Ethernet. WinCC flexible Runtime or the SIMATIC Multi Panel as OPC server then makes current process data available for one or more OPC clients. In the case of PC platforms the communication is by means of OPC DA (Data Access), while in the case of multifunctional platforms it is via OPC XML.

Locally acquired data is thus available across the whole plant, so that important information can be used centrally or to enable process data to be archived centrally. This also means the connection to SCADA- (e.g. SIMATIC WinCC), MES, ERP or office applications is possible. The relevant tags can be selected from the tag management of the OPC server across the entire network by means of the OPC browser.

PCs with WinCC flexible Runtime can also be OPC DA clients and record data from other OPC servers, e.g. process data from any PLCs that are linked via OPC to WinCC flexible, or process specifications from higher-level applications for controlling the production. The OPC client belongs to the standard scope of delivery of WinCC flexible Runtime.



OPC communication to higher-level systems

## WinCC flexible/ProAgent – Greater availability through process diagnosis

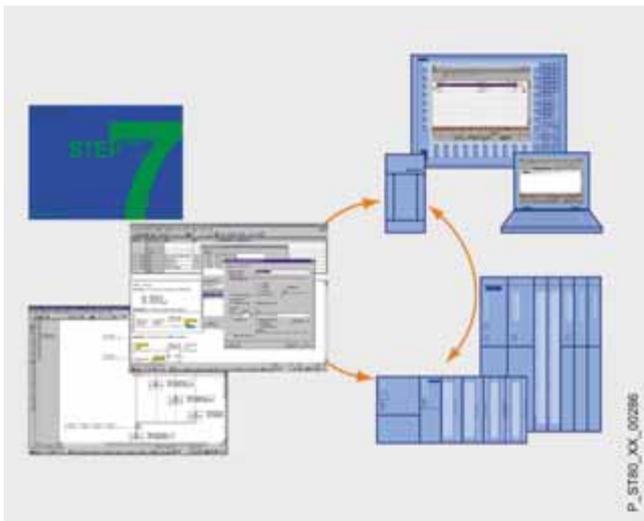
Increased productivity is being achieved more and more by cutting costs. In this context, the focus is increasingly on maintenance. The emphasis here is on rectifying faults as quickly and efficiently as possible. Ideally, the operating personnel should also perform part of the maintenance tasks. The operating personnel are on-site, they are familiar with the procedures and can intervene quickly. This saves time and reduces costs.

In the event of a process fault, process diagnosis with ProAgent will provide information about the location and cause of that fault and support personnel with troubleshooting. The ProAgent solution has been optimized specifically for use with SIMATIC S7-300/S7-400 and SIMATIC WinAC. It can be used in combination with the S7-PDIAG, S7-GRAPH and S7-HiGraph STEP 7 engineering tools. The ProAgent option package features standard displays that are updated with process-specific data during runtime.

### Standard views instead of configuration

ProAgent is available for various devices and software platforms from the SIMATIC HMI range: Panels and Multi Panels, WinCC flexible and WinCC. ProAgent includes standard views that are matched to the requirements of the process diagnosis at a plant or machine. During configuration, the data relevant for the process diagnostics, such as symbols, comments, alarm texts, are stored in a standardized data store. At runtime the standard views are then filled with process-specific data.

Alarm view, Unit overview, Diagnostic detail view, Motion view and Step sequence view are available as standard views.



Process diagnostics with WinCC flexible/ProAgent

### Benefits

- Integral component of Totally Integrated Automation (TIA): Increases productivity, minimizes engineering outlay, reduces lifecycle costs
- Support in troubleshooting, increasing machine and plant availability, reducing downtimes
- No additional configuration expense for the diagnostics functionality due to automatic generation of the diagnostic-relevant parts for PLC and HMI
- Frees up PLC capacity with regard to memory and program execution time
- No special know-how required from operator

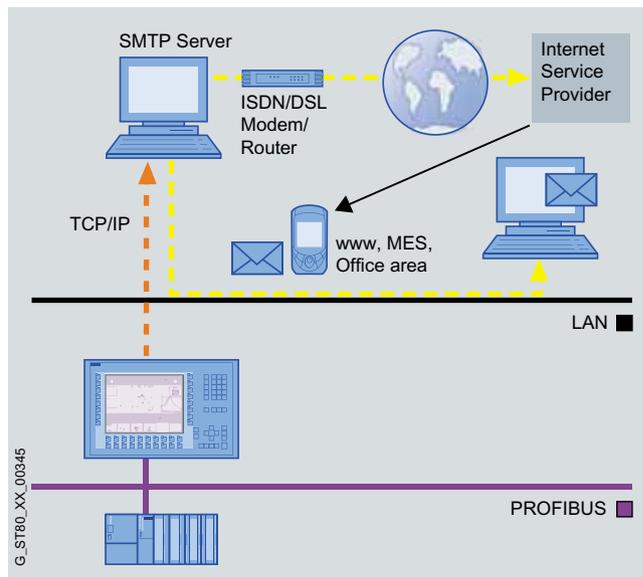
### Functional scope

- Context-sensitive diagnostics initiation due to process error message
- Output of operands with symbols and comment
- Switching is possible between LAD, STL and signal list
- Supporting fault rectification with direct process access when using the motion display
- Output of the faulty operands directly in the alarm including address, symbol and comment
- Consistency test in runtime: Inconsistent diagnostic units are marked with icons.
- This permits quick locating of faults regarding configured data in the commissioning phase.
- Direct, unit-related entry point in the diagnostic display from user displays by using ProAgent functions
- Automatic unit or message-related entry to STEP 7 (LAD/STL/FD editor, S7-GRAPH, as well as HW CONFIG upon system error messages)
- S7-GRAPH OCX for the graphical representation of step sequences (overview representation)

## WinCC flexible/Sm@rtService – Service and diagnostics via the Internet

### Service and diagnostics via the Internet

- Remote maintenance and servicing of machines and plant via Internet/intranet
- Definitive, event-controlled alerting of service personnel to fault states via e-mail/Text message
- Operator station diagnostics via pre-configured diagnostics functions and screens
- Service and maintenance functions (downloading projects, downloading/uploading recipes)
- Remote control of on-site stations with the aid of MS Internet Explorer



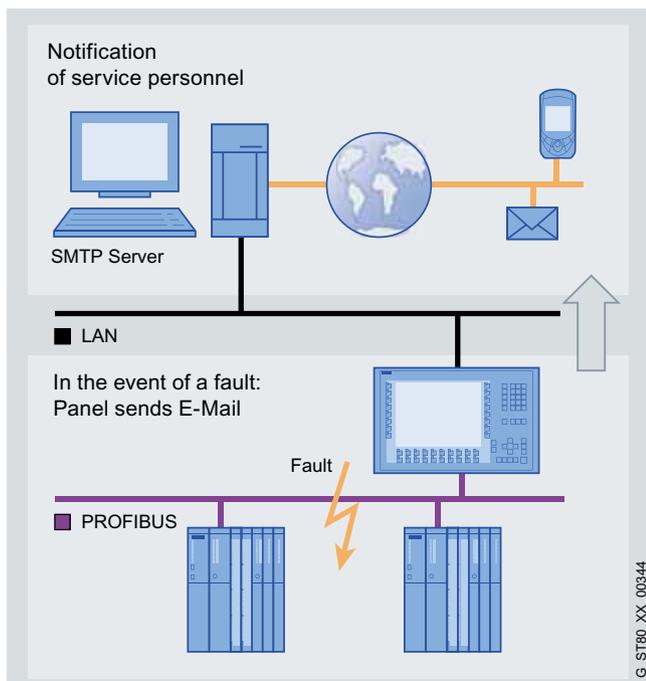
Sm@rtService – Automatic generation of e-mails /Text messages

### Automatic sending of e-mails

WinCC flexible runtime can send e-mails automatically to maintenance personnel via an SMTP (Simple Mail Transfer Protocol) server. The following events can trigger an e-mail to be sent:

- Alarm of a certain alarm class
- Actions on a parameterizable standard function (e.g. change of value of a tag, a script etc.) or user actions
- Potential contents of an e-mail are:
  - Subject
  - Message text with process tags (max. 256 characters)
  - Date/time
  - E-mail address for replies

When you use an e-mail/text message gateway, you gain access to standard networks and in critical situations you can send a text message from the on-site station to your cell phone. For this, you require an external service provider



Sequence for an "typical" service case

## Benefits

- Global access by the service and maintenance personnel to machine/plants
- Increased productivity through prompt clearance of faults or downtimes
- Avoidance of expensive on-site service calls

## Diagnostics and maintenance

The on-site station provides you with standard HTML pages for diagnostics and maintenance purposes, which you can individually extend and add to as required. From the home page, the following standard functions can be initiated:

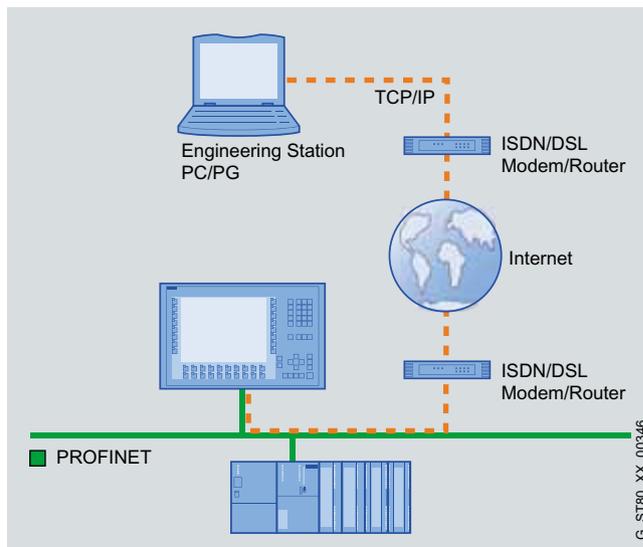
- Remote control of the station
- Starting and stopping the runtime for maintenance purposes
- Remote access to recipe data records, passwords and information specific to the system (e.g. system alarms)
- Access to files of the station via the file browser
- Downloading of configuration data

In order to rule out unauthorized access, a password protection can be activated, in which different passwords can be configured depending on the functions to be initiated (e.g. system diagnostics, file browser etc.). For the access to critical tags on the target system, an additional specific password protection can be set up.

Within the scope of the maintenance functions, the latest configuration data, recipe data sets or passwords can be transferred to the operator panel, without a service engineer having to be present on site.



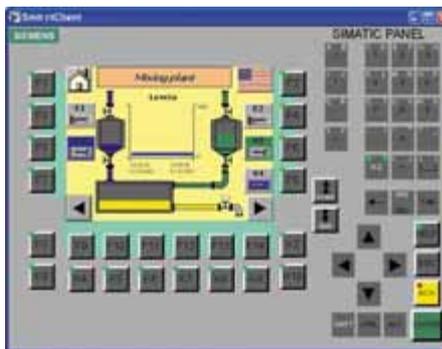
Sm@rtService – Homepage



Sm@rtService – Remote control of an on-site station via the Internet

## Remote control via Internet Explorer

For the remote control and monitoring of stations with WinCC flexible, a standard browser is all that is required (Microsoft Internet Explorer V6.0 SP1 or higher). Via the standard HTML page for remote control, you can then download a tool in the form of an executable program, the Sm@rtClient-Viewer, which displays not only the selected image without additional installation, but also the layout of the device on site, e.g. the membrane front of a keypad device. With this tool you can then operate the HMI device as if you were on site, except that the keys are not really actuated, but operated by clicking the mouse.



Sm@rtService – Remote control of a panel by means of Sm@rtClient Viewer

## WinCC flexible/Audit – Traceability and simple validation

### Benefits

- Conforming to the GMP requirements for the pharmaceuticals industry (e.g. the Food and Drug Administration)
- Reduced engineering and validation overhead
- Available for panels and multi panels in the 270 Class an above, as well as PC-based solutions
- Ideally suitable for machine builders and pharmaceutical companies who must meet high quality requirements (e.g. in the supply of machines and plant components for applications requiring validation)

For high quality requirements with reference to the products to be manufactured and the production process, WinCC flexible with its Audit and ChangeControl options offers a high level of support.

### Validation and traceability

"Ready for Validation" now also applies to machine-level applications. The WinCC flexible/Audit option covers essential requirements of GMP (Good Manufacturing Practice) and demands of the Food and Drug Administration (FDA) for applications requiring mandatory validation according to 21 CFR Part 11 – in the pharmaceutical industry, production of active ingredients and medications, and to some extent also in the cosmetics and fine chemicals industries, insofar as they are integrated into the process chain with the pharmaceuticals sector, or market primary products. Audit simplified the construction of machines for these sectors, as essential functions for meeting these requirements are already offered as standard and, in this way, individual machines or autonomous plant sections can already be qualified by the supplier, rather than waiting until integrated into the overall plant. At the same time audit trails are also suitable for tracking production processes for increasing product quality, as stipulated, for example, in EC Directive 178/2002 for the food and beverages sector.

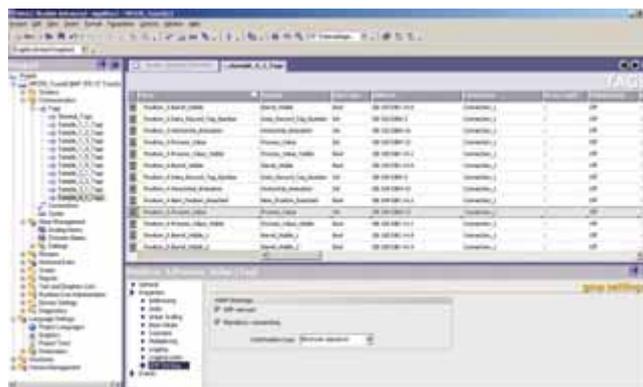
### Secure access control including electronic signature

An access protection is already guaranteed in the basic system, which insures that only authorized persons have access to the HMI device within the scope of their responsibility. Each user is assigned to a user group with defined function rights. This prevents unauthorized users, for example, from modifying recipes or starting process steps without permission.

### Central user administration using SIMATIC Logon

The HMI devices can if required be integrated into a central, plant-wide user administration with the SIMATIC Logon option. SIMATIC Logon integrates itself into the security system and the user administration of Windows.

Activities within the plant must be capable of unique assignment to individual persons. For this reason, the login and logout processes are recorded with time stamps. The two-component authorization with username and password, the password aging (insuring the passwords are changed regularly), the blocking of users by the administrator and the automatic logout after prolonged inactivity of the user are further system functions that insure high quality standards in production and simplify validation.



Parameterization of GMP-relevant tags

Operator actions, such as the input of setpoints or the viewing and loading of recipes, can be augmented with an additional request for an electronic signature and a comment, which is of course automatically logged in the Audit Trail.

### Recording of operator actions in Audit Trails

In process operation, all GMP-relevant changes to tags and any operator actions are recorded as Audit Trails in a CSV file. Such operator actions can be, for example, the input of process data, the starting of recipes or an alarm acknowledgment, but also alarms from the user administration, such as the logging on or off of a user. The Audit Trails registered in the project can be conveniently visualized by means of a viewer. This shows exactly who operated what and when – with minimal configuration overhead. In addition, a checksum procedure is used to check that the data in the Audit Trail has not been manipulated.

The change tracking of production processes via Trails is already possible in Panels and Multi Panels of the 270 series or higher. Two versions of the option package are available:

- WinCC flexible/Audit for Panels
- WinCC flexible /Audit for WinCC flexible Runtime

The screenshot displays the 'Audit Trail' viewer interface. It features a table with multiple columns, including 'Date', 'Time', 'User', 'Action', and 'Comment'. The table contains numerous rows of data, representing individual operator actions such as 'Start of Production', 'Change of Setpoint', and 'Alarm Acknowledgment'. The interface also includes a search bar and a list of filters on the left side.

Audit Trail – Displayed via the viewer

### Logging and reporting

WinCC flexible permits logging and reporting – depending on requirement – either locally or, in distributed systems, also centrally. "Local" in this context means that the CSV files are stored on the HMI device on site. "Central" on the other hand means that these are sent cyclically to a PC in a local control room or to a higher-level SCADA system (for example, SIMATIC WinCC) . This supports solutions for the long-term archiving and restoration of the data.

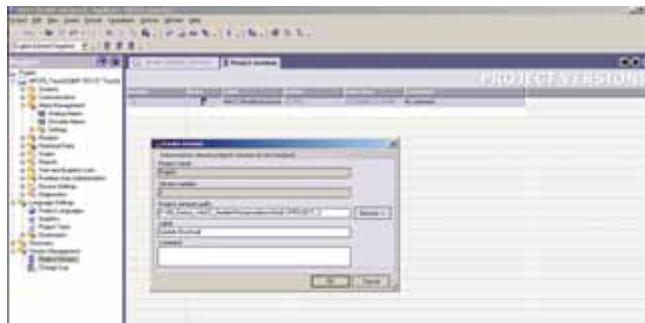
## WinCC flexible/ChangeControl – Versioning and Change Tracking

### Benefits

- Consistent backup of configuration data
  - Administration in a database
  - Versions management for changes of the project data (with rollback function)
- Tracking of configuration changes
  - Seamless verification of the change history over the entire life cycle
- Validation support
  - Simplifies the validation in the case of project changes
  - Supports the retention of the validated status of the plant

Once a plant has been commissioned and validated, changes to the configuration may become necessary in the course of adaptation or extension. All changes to the plant can be recorded and documented by reproducible versions from the time production started throughout its entire service life. Accordingly, changes to the project, similar to the log used during runtime operation, must be recorded in the audit trail of the configuration, the "Change Log". Any change to the configuration can be recorded and assigned a version number with the WinCC flexible/ChangeControl option. This also fulfills the FDA requirements with regard to the subject of change control.

Generally, you can back up intermediate states of complex new developments or expansions with the change control function and perform a rollback, if necessary. The change control function should be used for mechanical engineering and special machine construction if you want to manage your project clearly, for example, to keep track of delivered customer versions and subsequent changes. Change control can also be used as a basis for charging for services rendered. Versioning and the rollback function are specifically demanded in the automotive industry.



*Management of project versions in ChangeControl*

# Technical data

## SIMATIC WinCC flexible Runtime

WinCC flexible Runtime	
The specified values are maximum values	
<b>Images</b>	500
Fields per Screen	400
Tags per Screen	400
Static text	30.000
Complex Objects per Screen (e.g. bar graphs)	2000
Trends	40
Graphics Lists	800
Text Lists	500
Number of entries in symbol tables	3500
<b>Tags</b>	4096
<b>Bit-triggered / Analog Alarms</b>	4000 / 500
Message text (number of characters)	80
Number of Process Values per Alarm	8
Alarm Buffer Size	1024
Pending Alarm Events	500
<b>Logs</b>	100
Loggable Data	Process data, alarms
Max. Entries per Archive (incl. sequential archives)	500.000
Archive types	Circular log, Sequential log max. 400 per log)
Data storage format	CSV (Comma Separated Values), RDB (Runtime Data Base) and connection to ODBC database (not included in scope of delivery)
<b>Recipes</b>	1000
Elements per Recipe	2000
Data Records per Recipe	5000
<b>Password protection</b>	
User rights	32
Number of User Groups	50
<b>Visual Basic Scripts</b>	200
<b>Max. Online Languages</b>	16
<b>Communication</b>	
<b>SIMATIC S7 MPI interface/PROFIBUS DP interface/Ethernet</b>	
WinCC flexible Runtime permits up to 8 connections depending on the scope of the configuration (communication).	
<b>SIMATIC S7 PPI interface</b>	
Max. number of connections: 1 from the point of view of WinCC flexible Runtime 4 S7-200s for OP77B using PPI advanced	
<b>SIMATIC S5 PROFIBUS DP interface</b>	
Max. number of connections: 1 from the point of view of WinCC flexible Runtime (not for Windows Vista)	
<b>Multi-Protocol Operation</b>	
OPC Client or SIMATIC HMI HTTP protocol are additive, which means they can be used in conjunction with other PLC links.	

System requirements	
<b>Operating systems</b>	Windows XP Professional (32 Bit) SP2 Windows XP Embedded Windows Vista Business (32 Bit) Windows Vista Ultimate (32 Bit) For WinCC flexible Micro: Windows XP Home
<b>Processor</b>	<ul style="list-style-type: none"> <li>with Windows XP, minimum: 300 MHz</li> <li>with Windows XP, recommended: ≥ Pentium III, 500 MHz</li> <li>with Windows Vista, minimum: 1 GHz</li> <li>with Windows Vista, recommended: ≥ 1 GHz</li> </ul>
<b>Graphic</b>	Resolution: 640 x 480 ... 1600 x 1200 (SVGA)
<b>RAM</b>	<ul style="list-style-type: none"> <li>with Windows XP, minimum: 128 MByte</li> <li>with Windows XP, recommended: ≥ 512 MByte</li> <li>with Windows Vista, minimum: 1 GB</li> <li>with Windows Vista, recommended: ≥ 1 Gbyte</li> </ul>
<b>Hard disk drive</b> (available memory)	≥ 250 MByte

Connection options for WinCC flexible Runtime	
<b>Siemens controller systems</b>	
<b>SIMATIC S7</b>	PPI MPI PROFIBUS-DP, TCP/IP (Ethernet), PROFINET Integr. Interface (WinAC)
<b>SIMATIC S5</b>	AS 511 PROFIBUS-DP
<b>SIMATIC 500/505</b>	NITP PROFIBUS-DP
<b>SIMATIC HMI HTTP Protocol</b>	HTTP/HTTPS (Ethernet)
<b>SIMOTION</b>	PROFIBUS DP/MPI/Ethernet
<b>SINUMERIK</b>	with HMI configuration package WinCC flexible
<b>PLCs from other manufacturers</b>	
<b>Allen Bradley</b>	DF1, DH485 Ethernet
<b>GE Fanuc</b>	SNP/SNPX
<b>LG GLOFA</b>	GM
<b>Mitsubishi</b>	FX/MP4
<b>Modicon</b>	Modbus/Modbus TCP/IP
<b>OMRON</b>	Link/Multilink P2
<b>OPC (client + server)</b>	Data Access V2.0 as well as Data Access V1.1 (COM)

## Get more information

WinCC flexible:

[www.siemens.com/wincc-flexible](http://www.siemens.com/wincc-flexible)

Efficient configuration with WinCC flexible:

[www.siemens.com/wincc-flexible-easy](http://www.siemens.com/wincc-flexible-easy)

For further details, see SIMATIC Guide manuals:

[www.siemens.com/simatic-docu](http://www.siemens.com/simatic-docu)

Demo projects:

[www.siemens.com/wincc-flexible-demo-projects](http://www.siemens.com/wincc-flexible-demo-projects)

Further publications on the topic SIMATIC are available at:

[www.siemens.com/simatic/printmaterial](http://www.siemens.com/simatic/printmaterial)

For further technical documentation, see our

Service & Support portal:

[www.siemens.com/automation/support](http://www.siemens.com/automation/support)

For a personal discussion, you can locate your nearest contact at:

[www.siemens.com/automation/partners](http://www.siemens.com/automation/partners)

You can use the A&D mall for direct orders via Internet:

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BS 0808 3.5 ROT 28 En / 801619  
Printed in Germany  
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