**SIMATIC WinCC**
Process Visualization using Plant Intelligence

simatic hmi
WinCC

**SIEMENS**

# SIMATIC WinCC –
# More transparency for production

The range of **SIMATIC® HMI®** operating and monitoring products includes two software families.

For applications close to machines and the process in the fields of mechanical and plant engineering and serial mechanical engineering, SIMATIC HMI offers the SIMATIC WinCC flexible engineering and visualization software. The operator interfaces that you can configure using WinCC flexible range from Micro Panels – that are designed for applications with SIMATIC S7-200 controllers – through to on-site solutions using SIMATIC Panel PCs and local control rooms using standard PCs. In this connection, the solutions in question are in principle single-user ones.

SIMATIC WinCC® is a scalable **process visualization system (SCADA)** that is graduated by price and performance, with efficient functions for controlling automated processes. With SIMATIC WinCC, "perfect process visualization" stands for complete operating and monitoring functionality under Windows for all industry segments – ranging from simple single-user systems through to distributed multi-user systems with redundant servers and the structure of a cross-site solution including Web clients. One of the special features of WinCC is its total openness. It can be readily used in combination with standard and user programs, creating human-machine interfaces which precisely meet practical requirements.

System houses can develop their own applications via the open interfaces using WinCC as a specific basis for their system expansions.

WinCC is a modern system with an attractive user interface for use in the world of the office and manufacture, offering mature and reliable operation and efficient configuration. It is scalable for simple and complex tasks. Together with the integrated process database, WinCC represents the information exchange for cross-company, vertical integration and thanks to **Plant Intelligence** provides much more transparency in production.

One of the particularly impressive things about SIMATIC WinCC right from the start was on the one hand the **high level of innovation**, which makes it possible to recognize coming trends at an early stage and to implement them; on the other hand, the long-term product strategy based on standards that guarantee your investment.

As a global market leader in automation, Siemens has incorporated its decades of industrial automation experience, coupled with leading edge technologies, to establish WinCC as the industrial standard for process visualization. WinCC should always be the first choice whenever the optimal operation of your plant and machinery is being considered.

This brochure is based on the SIMATIC WinCC V6.2 version.

# Contents

# SIMATIC WinCC –
# Product range

**WinCC system software**

You can choose between the following basic variants of
WinCC system software:

- WinCC complete package (**RC**: license for runtime and
  configuration)
- WinCC runtime package  (**RT**: runtime license)

There are different packages available with 128/256/1,024/
8,000 and 65,536 **PowerTags**. Only tags that have a process
connection to the controller or other data sources using a
WinCC communication channel are designated as Power-
Tags. Up to 32 messages can be derived from one PowerTag.
In addition, internal tags without a process connection are
available as a complementary system feature.

**Powerpacks** allow you to move up to a version with a
higher number of tags. Go ahead and start with the smallest
available package and then later expand with one of the
powerpacks.

Powerpacks also allow you to move to higher numbers of
archive tags, from 512 by 1,500, 5,000 or 10,000 up to
120,000 tags.

**WinCC Comprehensive Support**

WinCC Comprehensive Support offers you one Software
Update Service (SUS) in the form of a comprehensive sup-
port package that contains the latest updates as well as lots
of useful information and software on WinCC.

The overall package includes the latest updates/upgrades
for WinCC incl. WinCC options. The WinCC user receives a
welcome package initially and over a period of 12 months,
replacements are delivered automatically. The contract is
automatically extended by a further year unless canceled
up to 12 weeks prior to expiration. The automatic supply of
current updates and Service Packs for WinCC ensures that
the latest WinCC version is always available.

**Packages with WinCC runtime software**

The **SIMATIC Panel PC
packages** with WinCC
support easy ordering of
all components for a Panel
PC-based HMI solution. This
package offers the follow-
ing benefits:

- Easy to order
- Cost savings as compared to purchasing individual compo-
  nents
- Hardware perfectly matched to the SIMATIC HMI software
- System-tested solution

**WinCC options**

Individual functional or industry-specific expansions are
available in the form of WinCC options and WinCC add-ons®.

WinCC options are products of Siemens Automation & Drives
and are supported by the technical advisory service and
the central Hotline. WinCC options are available for a wide
range of sensible expansions to the basic WinCC system and
you can combine them in any way you like to meet your
requirements. This chapter gives an overview of the option
packages that are available for SIMATIC WinCC V6.

**Scalable plant configurations**
**WinCC/Server** – is for expanding a single-user solution into
a powerful (distributed) client/server system with up to 12
WinCC servers and 32 clients.

**WinCC/Central Archive Server** – for setting up scalable,
central process data archiving with up to 120,000 archive
tags based on Microsoft SQL Server 2005.

**WinCC/Web Navigator** – gives you the option of operating
and monitoring the plant across the Internet/Intranet with
the help of Microsoft's Internet Explorer without needing to
make any changes to the WinCC project. Thin Client solutions
allow you to use robust local equipment and mobile PDAs
under Windows CE in addition to PCs.

**Plant Intelligence and IT & Business Integration**
The crucial factors for consistent IT & Business Integration
and optimizing production by means of Plant Intelligence are
standard interfaces and powerful tools for display, analysis
and evaluation.

**WinCC/DataMonitor** – is for displaying, analyzing, evaluat-
ing and distributing current process status conditions and
historical data (measured values, messages, user
data) from the process database. You can
install the DataMonitor client that
you need to do this on any
office PC you like. The Data-
Monitor provides several
tools for display or analysis.

**WinCC/DowntimeMoni-
tor** – for acquiring and
analyzing downtimes in
machine- or line-oriented
production facilities
and deriving from this
data plant-specific
parameters known as
Key Performance Indica-
tors (KPIs). Analyses of reasons
for disturbance give you information about
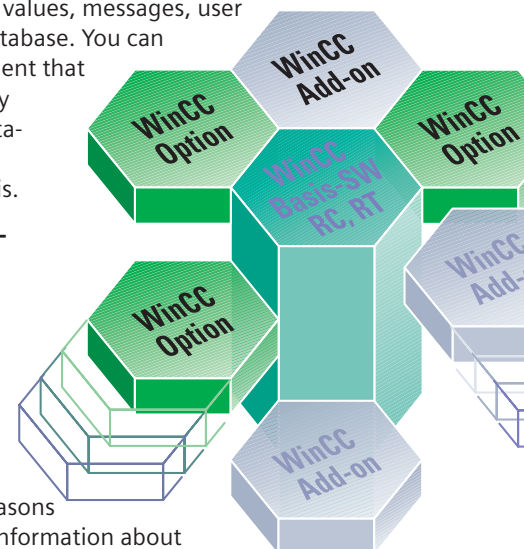
the frequency and duration of machine or plant standstills. You can integrate appropriate display instruments without difficulty.

**WinCC/ProcessMonitor** – ensures optimized production by functioning as a Management Information System as well as an online quality analysis tool. It calculates customer-specific KPIs, makes possible evaluation of archived process values and messages and passes on calculated values to WinCC.

**WinCC/IndustrialDataBridge** – supports linking of external databases, office applications and IT systems via WinCC OLE-DB and OPC DA with the help of configurable standard software.

**WinCC/Connectivity Pack** – allows other applications to access the WinCC archives via OPC HDA or WinCC OLE-DB or the current values via OPC XML and passes on messages via OPC A&E. Using **WinCC/Connectivity Station**, you can configure any Windows computer that does not have WinCC installed as an evaluation station.

### Increased availability
**WinCC/Redundancy** – increases system availability due to redundant WinCC stations or servers that monitor each other, that ensure operability of the plant and make possible contiguous data acquisition.

**WinCC/ProAgent** – makes possible selective and rapid process diagnostics with plant and machinery. Due to its complete integration into the SIMATIC process diagnostics world, ProAgent offers a consistent solution based on STEP 7, the Engineering Tools and on SIMATIC S7 control systems.

**SIMATIC Maintenance Station** – This option offers intelligent strategies for preventive maintenance and, in operation ensures optimization of the plant and a reduction in preventive maintenance costs.

### Validation and tracking
With the options of **WinCC/Audit** (logging operator actions, monitoring configuration changes and tracking the production process by means of Audit Trails), **WinCC/Change-Control** (project versioning, tracking project changes) and of **SIMATIC Logon** (central, cross-plant user management) and appropriate measures at engineering, SIMATIC WinCC makes it easier to comply with the requirements of 21 CFR Part 11 in the pharmaceutical industry, inhibitor and drug manufacture as well as with EU 178/2002 in the food and beverages industries.

### SCADA expansions
**WinCC/User Archives** – supports the use of user archives in which you can save data in the form of data records and exchange it as recipes or charge data between WinCC and the controller.

### System expansions
**WinCC/IndustrialX** – allows you to configure user-specific objects using ActiveX technology. The objects can be standardized, used several times and you can change them on a central basis.

**WinCC/ODK** – describes open programming interfaces (C-API) that you can use to access data and functions of the WinCC configuration and runtime system and even to create your own applications.

## WinCC add-ons

WinCC add-ons® are developed and marketed by other Siemens departments and by third-party vendors. WinCC add-ons are supported by the respective product supplier who is also the contact person for integrating the product into the automation solution.

### Premium add-ons
WinCC Premium add-ons are quality products that have been checked for compatibility with the WinCC basic system at the Siemens A&D AS test center and are primarily supported by the central A&D CS Hotline. WinCC Premium add-ons are available in the categories

- Connectivity,
- Process management,
- Diagnostics and maintenance,
- Industry-specific and technology solutions,
- Engineering tools.

For more information about WinCC add-ons, visit

**http://www.siemens.com/simatic-wincc-addons**

# SIMATIC WinCC –
# Highlights

## Highlights

- A global solution
  Solutions for all industry segments
  Meets the requirements of 21 CFR Part 11
  Multilanguage capabilities for global deployment
  Can be integrated in your total automation strategy

- All SCADA functions on board

- Easy and efficient to configure

- Consistently scalable including the Web

- Open standards for simple & complete integration

- Integrated Process Historian as an information broker

- More transparency for production using
  Plant Intelligence

- Expandable using options and add-ons

- Part of Totally Integrated Automation

### A global solution

WinCC's configuration interface was designed right from the start to be used on an international basis: this means that you can switch between **different languages** including four Asian configuration languages. You can also design your project in **several target languages** at the same time and switch between them during operation.

The base system is designed on a **technology- and industry-independent basis**. References from virtually all applications and branches of industry in plant and mechanical engineering prove this: including the pharmaceutical industry for which WinCC with appropriate options meets the requirements of **21 CFR Part 11**.

WinCC's scope of supply includes the most important communications channels for connecting SIMATIC controllers as well as non-proprietary channels like PROFIBUS DP/FMS and OPC. Open interfaces, a wide range of options and the Process Historian as an **information exchange** – which is included in the basic system – all support IT & Business Integration in your company.

### All SCADA functions on-board

Appropriate SCADA functions are basic features of the system

- for visualizing process sequences and status conditions on a fully graphical basis,

- for operating the machine or installation using an individually designed user-interface with own menus and toolbars,

- for reporting and acknowledging events,

- for archiving measured values and messages in a process database,

- for logging process and archive data and

- for managing users and their access permissions.

The system continuously records sequences and events that are relevant to quality which makes it possible to verify quality on a contiguous basis.

### Easy and efficient to configure

Sophisticated configuration functions **drastically reduce** the time and effort needed for engineering and training:

- User-friendly, object-oriented graphics editor,

- Comprehensive libraries,

- Efficient modular technology,

- Fast changes due to online configuration,

- Configuration tool for handling bulk data,

- Transparency due to cross-reference list.
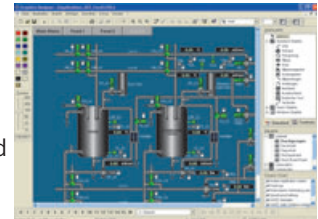
### Consistently scalable – including the Web

To be able to cope with growing requirements, you must be able to expand process visualization at any time without losing the initial investment by having to carry out complete reconfiguration. This means that **security of investment** is crucial. SIMATIC WinCC offers the required consistent scalability, from a single-user solution right through to a redundant client/server solution with central Process Historian and operator stations on the Web.

## Open standards for easy integration

WinCC is consistently based on the highest levels of **openness** and the **highest integration capability**: ActiveX controls for technology-specific and vertical market extensions, non-proprietary process communication via OPC, standard interfaces for external accesses to the database (WinCC OLE-DB and OPC HDA), integrated standard script languages (VBScript and ANSI-C), access to data and system functions via the Application Programming Interface (API) using the Open Development Kit (WinCC/ODK), user-specific extensions to the WinCC graphics editor by means of Visual Basic for Applications (VBA).

## Integrated Process Historian as an information exchange

SIMATIC WinCC integrates a powerful, scalable Historian based on **Microsoft's SQL Server 2005** in the basic system. This offers users a wealth of options ranging from high-performance archiving of current process data and events, through long-term archiving with high levels of data compression and backup function, up to a central information exchange in the form of a central cross-company Historian server.

## More transparency for production using Plant Intelligence

**Plant Intelligence** represents the effort in production companies to intelligently use information in a plant to reduce costs, to avoid scrap, to better utilize production facilities and in the final analysis to achieve greater effectivity and better economy. The high levels of system functionality (e.g. statistical functions for measured values and messages in the basic system), infinite openness, integrated Historian functionality and a range of options guarantee you new transparency in your production processes and sound decisions.
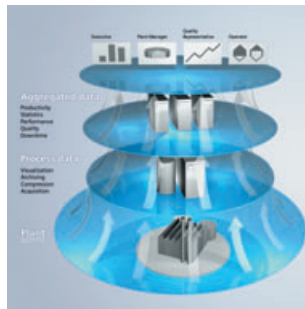
## Expandable using options and add-ons

The WinCC basic software is the core of a large number of different applications. Based on the open programming interfaces, a number of WinCC options (by Siemens A&D) have been developed as well as WinCC add-ons (by Siemens-internal and external partners). WinCC options can be used for scalable plant configurations, for Plant Intelligence and IT & Business Integration, for increasing availability, for system expansions and for supporting validation and tracking.
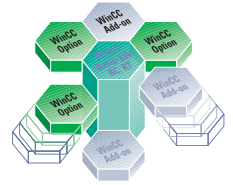
## Part of Totally Integrated Automation (TIA)

TIA allows you to completely integrate individual automation components, which allows you to reduce your engineering and lifecycle costs. This means that WinCC, for example, accesses directly the tag and alarm configuration system of your SIMATIC controller and uses its communications parameters. Right from the start, this allows you to avoid time-consuming and expensive multiple inputs and exclude possible sources of errors.

Another TIA system feature is its integrated diagnostics and maintenance. Interacting with other SIMATIC components, WinCC supports system and process diagnostics as well as maintenance in ongoing operation, for example calling STEP 7 blocks and hardware diagnostics directly from WinCC screens and localizing and eliminating errors with WinCC/ProAgent and preventive maintenance using the SIMATIC Maintenance Station.

# SIMATIC WinCC –
# A global solution

## Solutions for all industry segments

SIMATIC WinCC fits into a wide range of applications since the basic system is designed on a non **technology- and industry-specific** basis. It is modular and can be expanded in a flexible way; it makes possible both simple single-user applications in mechanical engineering as well as complex multi-user solutions or even distributed systems including several redundant servers and clients in industrial and building technology. WinCC combines both production and process automation – numerous references across many applications in various industry segments prove this:

- Automobile production and suppliers,
- Chemical and pharmaceutical industries,
- Food, beverages and tobacco industries,
- Energy supply and distribution,
- Trading and service industries,
- Plastics and rubber manufacturing industries,
- Mechanical and plant engineering,
- Paper manufacture and processing, printing industry,
- Metal-processing and steel industry,
- Transportation and logistics,
- Water treatment and sewage clarification,
- Building services management and management of properties.

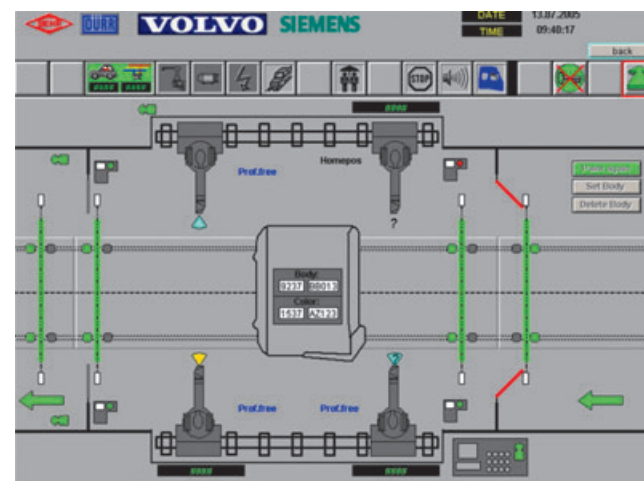You can find a large selection of current application articles at

**www.siemens.com/hmi-success-stories**



*Process picture from the plastics processing industry with language switching*
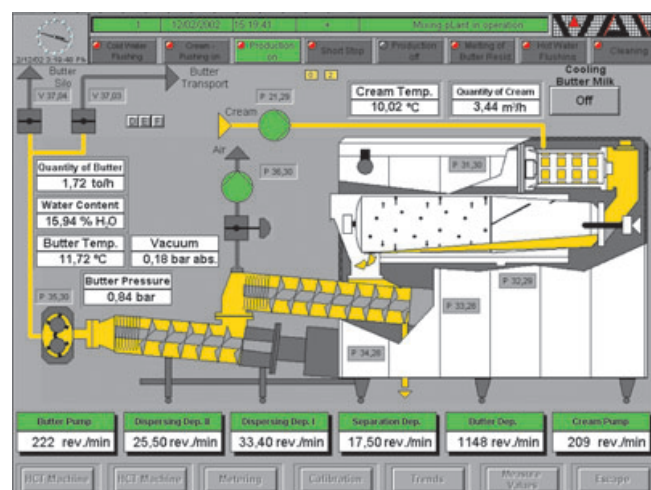


*Process screen from the food processing industry (butter machine)*



*Process screen from the vehicle building industry (Volvo)*

There is a wide range of WinCC options and add-ons for vertical market solutions. Using for example the options WinCC/Audit and SIMATIC Logon and with good engineering practices (which are documented in a white paper), SIMATIC WinCC complies with the requirements of **21 CFR Part 11** from the US Food and Drug Administration in the pharmaceuticals and the requirements of **EU 178/2002** in the food and beverage industries. These options make it considerably easier to validate plants, to track production processes and provide the most convincing and comprehensive response for these industry segments.

**Multilanguage capability for global deployment**

WinCC's configuration interface was designed from the ground up for deployment on an international basis: you can switch between German, English, French, Spanish and Italian **at the push of a button**. The Asian variant even supports Chinese, Taiwanese, Korean or Japanese language. You can of course design your project for **several runtime target languages**, i.e. German/French/Portuguese or English/Chinese languages at the same time. This means that you can use the same visualization solution on several target markets. To translate the texts, you only need a standard ASCII text editor.

**Can be integrated into a company's plant-wide automation strategy**

Through the use of OPC servers, there are virtually no limits to which controller platforms can be interfaced with WinCC. As part of Siemens Totally Integrated Automation philosophy, the scope of supply of WinCC includes all the most important communications channels for linking to SIMATIC S5/S7/ 505 controllers (e.g. via the **S7 Protocol Suite**), as well



*Process screen from the packaging industry*

as non-proprietary channels like PROFIBUS-DP/FMS and OPC; you can get other communications channels as add-ons.

SIMATIC WinCC integrates a powerful, scalable Historian based on Microsoft's SQL Server 2005 in the basic system, which can be used as a central information exchange in the form of a cross-company Historian server. Different clients for evaluation, **open interfaces** and **various options** are the basis of flexible and efficient IT and business integration. In particular, this makes it possible **to link to the production and company management levels** (MES and ERP).



*Overview screen from the waste water treatment industry*
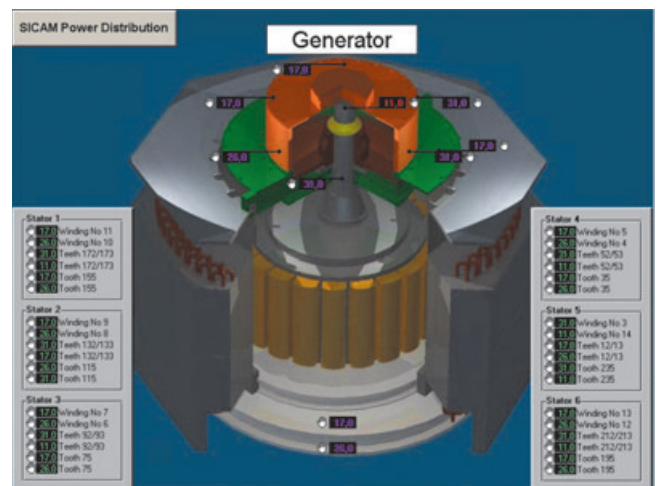


*Process screen from energy distribution (switchgear equipment with SICAM)*

# SIMATIC WinCC –
# All SCADA functions on board

**Integrated user management**

Using **WinCC User Administrator**, you assign and control users' access rights for configuration and runtime. As the administrator, you can set up at any time – including at runtime – up to 128 user groups each containing up to 128 individual users and assign them appropriate access rights to WinCC functions.

All operator stations are included in user management, including, for example, Web Navigator and DataMonitor clients too. WinCC's SIMATIC Logon option gives you central, plant wide user management that supports validation according to FDA 21 CFR Part 11
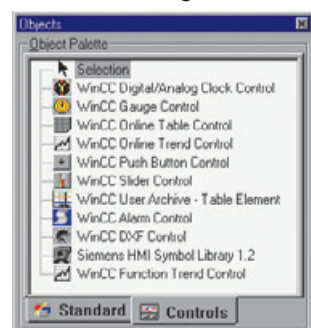


*Object palette of the WinCC Graphics Designer*
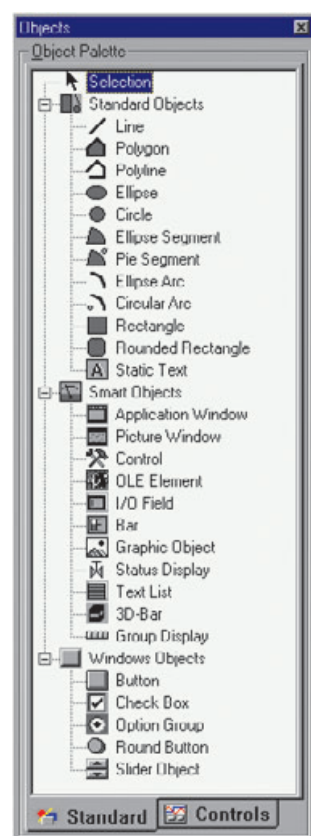


**Graphics system**

WinCC's **graphics system** processes at runtime all the inputs and outputs on the screen. You use the **WinCC Graphics Designer** to create the pictures that you use for visualization and operation in your plant.

Regardless of whether you have small, simple operation and monitoring tasks or complex supervisory tasks: Using WinCC standards, you can create custom configured user interfaces for any application – for safe process control and optimizing your entire production. Using your own menus and toolbars, you can create a project-specific look & feel.

**Operation...**

You can protect every operator input to the process, the archives and WinCC by locking it against unauthorized access. WinCC can record variable inputs – with the date, clock time, user name and a comparison between the old and new values. For applications in the pharmaceutical industry which must be validated according to 21 CFR Part 11, you can use the WinCC/Audit option.
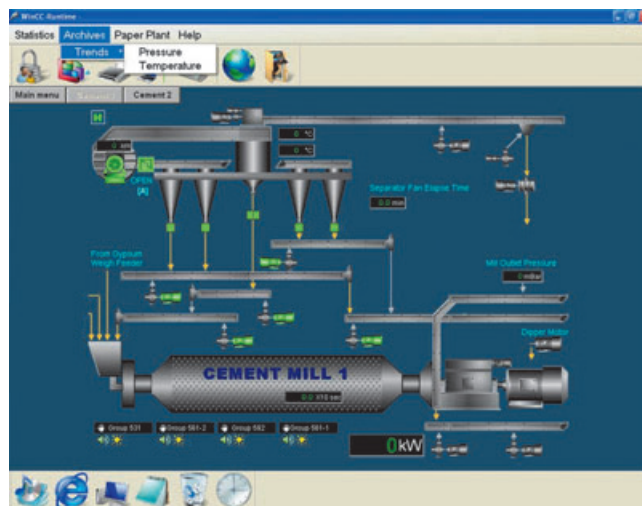


*A WinCC process picture from the cement industry with user-specific menus*

**... and Monitoring**

Draw your own conclusions! If you want to create an **attractive user interface** that is appropriate to the process, SIMATIC WinCC provides you the right tools, including a standard graphics library, menus, toolbars, buttons and controls up to user-defined objects.

Graphic objects can be directly controlled and specified by means of variable values or from programs allowing dynamic control of all screens and/or their components. WinCC also supports screens up to 4096 x 4096 pixels incl. panning, zooming, decluttering and thus provides a completely new feeling when carrying out operation and monitoring!

**Message system**

**Minimize downtimes – by means of alarms and messages**

SIMATIC WinCC doesn't just acquire process messages and local events; it also stores them in archives and then makes them available via a filtered or sorted basis. Messages can be derived from individual **bits**, can be a result of an **alarm message frame** directly from the automation system or can be generated by **analog alarms** in the case of out of limit conditions or can be based on an operation (operational message). Individual messages can be configured with a specific acknowledgement required.

**Freely definable message structure**

Since you can freely define the message structure, it is possible to tailor it to the special requirements of your own plant. Dividing into different text blocks (plant identification code, disturbance location, text, etc.) results in greater clarity and, in conjunction with the filtering or sorting function, makes it possible to start selective analyses. Classification

# SIMATIC WinCC –
# All SCADA functions on board
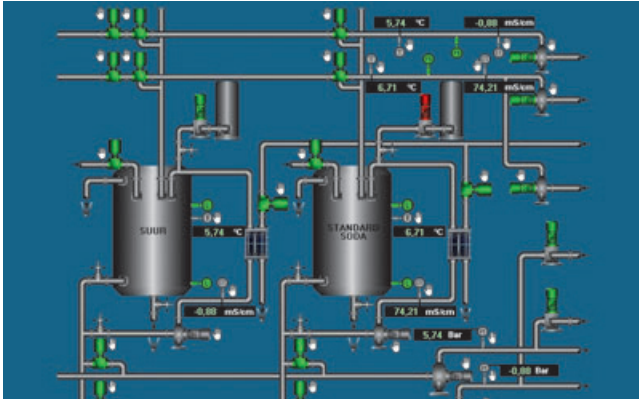


*A WinCC process picture from the food industry*

into up to 16 message classes makes possible priorization and localization of alarms, warnings, disturbances and errors from several plant areas. Within any one message class (e.g. alarm), you can differentiate between up to 16 priorities.

**Convenient message display**
Messages are displayed on the screen using the parameterizable WinCC Alarm Control. Using the contents of individual message blocks, you can filter and sort the display, e.g. on a chronological basis, by priorities or disturbance locations.

To still have a clear overview of events even when a large number of messages arrive, operators can use an **Alarm Hiding** system to suppress unimportant operational messages, with the system continuing to archive messages in the background.

**Archiving and logging messages**
Microsoft SQL Server 2005 is used for archiving messages, which guarantees **contiguous recording of all events**. The system archives messages in the case of message events, e.g. when the message occurs and in the case of changes of status in the message.

In the **message sequence log**, you can document the individual messages on a chronological basis. As a result, the



*Message hit list for arrived messages (Alarm Control)*



*WinCC Alarm Control for display of current or historical messages*

system prints out all the changes in status (arrived, departed, acknowledged) of the currently pending messages. In the **message archive log**, you can selectively create specific views of the archived messages.

**Statistical evaluations**
The **message hit list** indicates the average and total times that specific messages have been pending for (message duration) and, in a similar way, the average and total acknowledgement time. In this connection, you can of course filter by the relevant events, alarm locations and time intervals. This allows you to quickly appreciate where critical locations and bottlenecks are located on the shopfloor. To sort the messages for evaluation reasons on the message display, you just click on the head of the column and choose the desired sort criterion (e.g. "Frequency in descending order").

**Archive system**

**High-performance archiving for messages and measured values**
Archiving is carried out in archives in the Microsoft SQL Server 2005 database with **high levels of performance**: a central archive server can easily cope with up to 10,000 measured values and 100 messages per second as a continuous load (with spates of messages, as many as 15,000 every 10 seconds). The efficient, loss-free compression functions mean that the memory requirement is very low. You can archive process values cyclically (continuously), on an event or process-controlled basis (e.g. in the case of limit violations), as well as on a condensed basis (e.g. averaging).

**Archive size and segmenting tailor-made**
The system saves measured values or messages in an archive of a configurable size. On a practical basis, you can determine the maximum archiving period as one month or one year; or you can also specify a maximum data volume. Each archive can be segmented, and then (when completed) regularly exported to the long-term archive server. If required, all archived items are readily available to WinCC for analysis using on-board facilities. Exporting guarantees that even with long-term archiving no data is lost.

In the basic WinCC system, you can configure 512 archive variables. Powerpacks allow you to extend the number of tags to up to 120,000.

# SIMATIC WinCC –
# All SCADA functions on board

**Trend representations**
The process values are represented by means of the **WinCC Online Table** and **Trend Controls** that represent the data in tables or as curves. In this connection, the Tag Logging editor gives you the freedom to acquire and represent your process values in exactly the way that you want to, for example

- Online trend, archive curves, F(x) curves
- Different writing directions, representations of areas and limit values, interpolation, step curves, graduated curves, tables
- Cursor line, zooming, scale switching, start/stop, paging

You cannot just change the representation online; rather, you can also store the changes in the configuration data and parameterize a curve representation online for any tag you like.

Current values (online trends) and historical process values can be shown in the same trend display. To increase the clarity, only the Y axis of the currently selected trend can be shown if desired. Likewise, the common X axis can be highlighted via selectable coloring. A trend selection can be specified by the configuration or take place directly in the displayed trend via buttons, radio-buttons, etc.

Process values displayed in the trend display can be **exported into a CSV file** by clicking a button and then be analyzed with standard tools.

**Statistical evaluations for measured values**
In the case of acquired process values, you can determine for a specified time range the **minimum, maximum, average** and the **standard deviation** and display them. To provide improved representation and analysis options, you can configure the thickness of trend lines. If you press the right mouse button with the cursor above the curve, a tool tip shows detailed information on the test point: archive, archive tag, date/clock time and value. This yields easier data
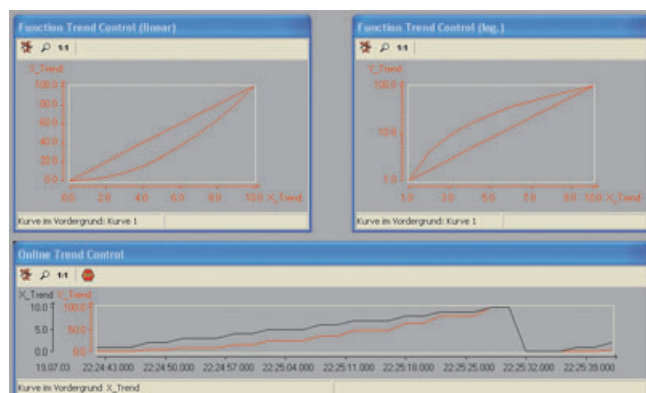


*Online curve and F(x) curves*



*Trend display with download button*

analysis due to the fact that it is also possible to use a second cursor line. It is now also possible to represent curves on a logarithmic basis and to export the displayed values in Excel format.

**Reporting and logging system**

WinCC has an integrated logging system that you can use to print data from WinCC or from other applications. This system prints data that was acquired at runtime in **configurable layouts** by means of different types of logs: from message sequence logs through system message logs and operator logs up to user reports. Before printing reports, you can save them as files and preview them on the monitor.

**On demand printing**
It is possible to start output of a report on a time- or event-driven basis or by means of a direct operator input, select a different printer for each print job, determine the contents dynamically at runtime, and determine or set online the appropriate log parameters.

**Merge external CSV data**
WinCC logs can also contain data from the database and external data in CSV format as a table or a curve in a log. To
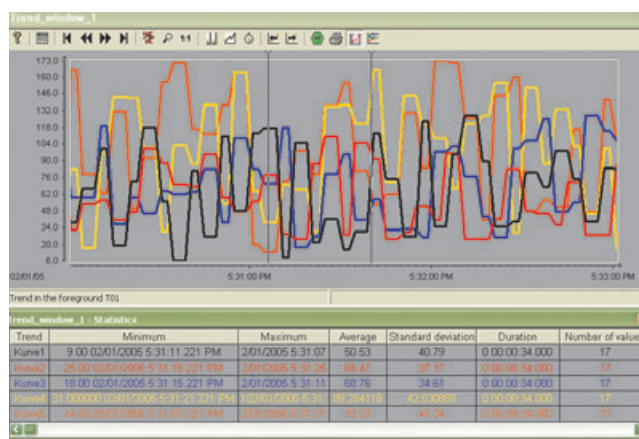


*Statistical functions for measured value archives (Online Trend Control)WinCC/Web Navigator*

display data from other applications as a table or a graphic, you can also develop your own report provider.

**I&C technology functions**

Basic Process Control is one of the basic features of SIMATIC WinCC and offers additional objects and configuration tools to allow you to easily implement typical **instrumentation and control technology requirements**. This means that you can use a wide range of instrumentation and control technology functions in process operation, e.g.

- Division of the screen into overview, working and key areas
- Navigating via a screen hierarchy
- Storing/recalling the user-specific screen composition
- Selection of process pictures and measuring points by name
- Setup of trends online
- Group displays to „OR" disturbances in lower-level disturbances and to directly jump to the relevant process picture
- Lifebeat monitoring with a plant configuration screen and automatic I&C (instrumentation and control) system messages

- Control of external signaling devices
- Time synchronization (setting the PC clock by DCF77 or GPS; distribution via PROFIBUS or Industrial Ethernet)



*Representation of instrumentation and control technology using the WinCC/Web Navigator Navigator*
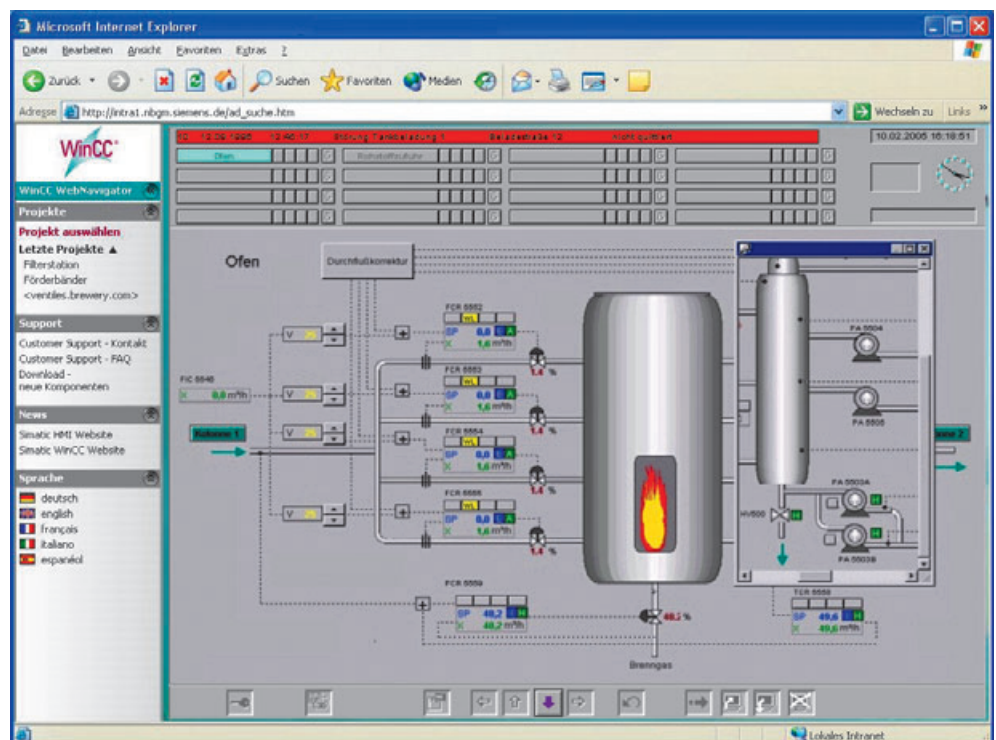
# SIMATIC WinCC –
# Easy and efficient to configure

In the life cycle of an automation solution, engineering costs make up as much as 50% of the total costs. Anyone who wants to noticeably lower these costs needs simple and efficient configuring tools – and an intuitive, user-friendly system. WinCC provides such tools!

Just use your day-to-day PC application experience and apply it to your industrial processes – that was the idea behind SIMATIC WinCC. The result was an object-oriented, multi-lingual engineering environment with configurable user interface, tool tips, a comprehensive on-line Help function and application examples.

### Leading edge technology

Linking a graphic object to an internal PLC tag for animation purposes is as easy as can be. As soon as a new object has been placed in the picture, an easy to edit dialog box ap-pears. The WinCC Graphics Designer also allows the user to easily specify and animate virtually all object properties with-out additional scripting. To ensure total flexibility, it is even possible to enhance an object's functionality with scripts.

The WinCC Graphics Designer supports configuring of 32 pic-ture layers. In complex pictures involving a large number of layered objects, individual layers can be hidden to maintain a clear view. Another user-friendly feature is that of modifying the properties of a group of objects simultaneously.

In general, you just copy objects that appear several times in the picture. When copying the objects, their tag links are copied one-to-one. To optimize rewiring, i.e. connection to other tags, WinCC offers the rewiring dialog, in which all tags connected to the selected object are listed and direct rewiring is possible.

*WinCC Library and SIMATIC HMI Symbol Library*
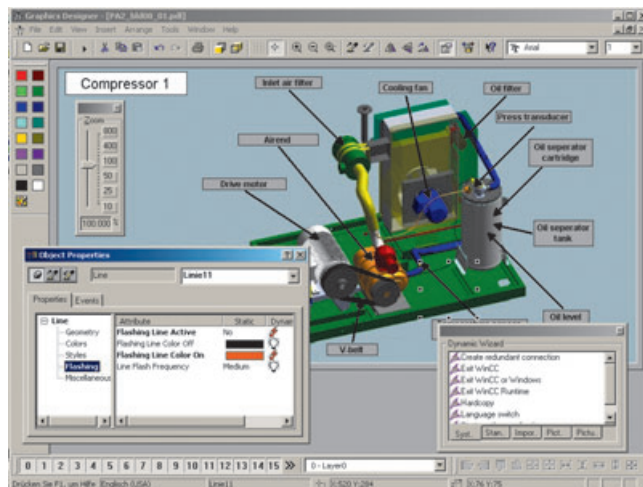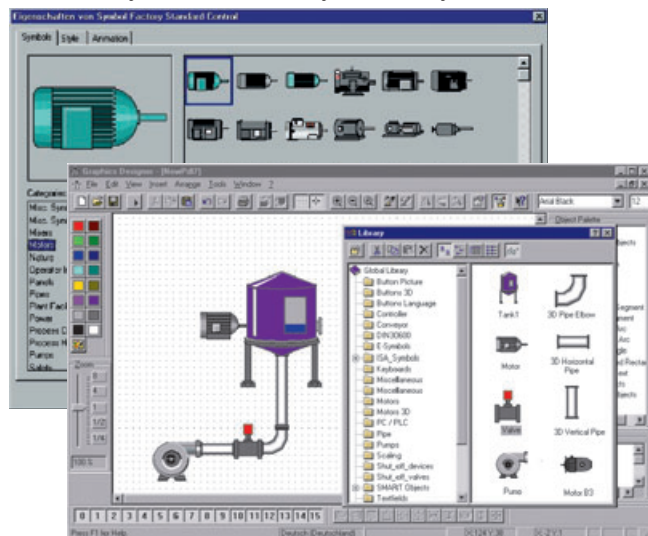




*Configuring pictures using the WinCC Graphics Designer*

### Wizards help cut engineering time

SIMATIC WinCC supports developers by providing wizards (assistants) for easy configuration tasks. The message wiz-ard, for example, offers default settings that developers can confirm or modify. Preview windows show the effect of the chosen parameters. If the developer confirms the settings, he can implement cost-effective and practical solutions in a very short time.

### Simply retrieve preconfigured modules from the library

Why keep reinventing the wheel? Once graphic objects have been created, the library makes it possible to reuse them in other pictures and/or projects. The library already comes with a large number of preconfigured objects like pumps, motors, pipes, gauges, switches etc. Developers can create company-, technology-, or industry-specific standards, mak-ing it quick and easy to create projects. The objects for those projects are finished and sorted by topic in the library and can be brought into the pictures via Drag & Drop. Inserting objects in the library is just as easy. In order to be able to make full use of multiple languages in WinCC's runtime mode, objects like these should be configured in several languages.

### All types of modular technology

You can also carry out configuration using modular technol-ogy where you can group any number of graphic objects you like to form a new user-specific object, which means that only the interface parameters that are relevant to process linking are visible to users. Using WinCC/IndustrialX, you can configure your own technology-specific ActiveX controls. And the best thing about this is that you can change things once on a central basis and it has an effect on every location where you use the object!

*Cross-Reference – listing of all used tags, functions etc.*

## Always in the picture thanks to cross-reference lists & picture properties displays
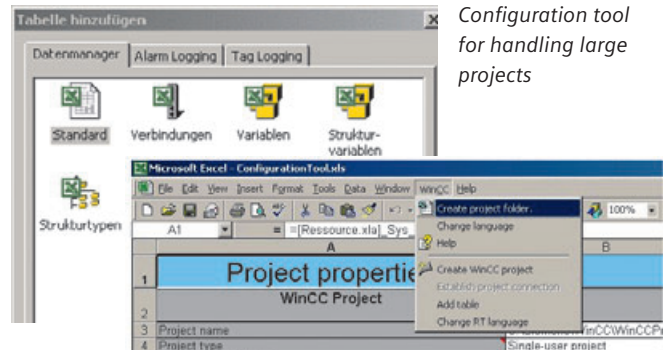
Service technicians or plant supervisors often find it difficult to find their way into a project and to analyze the individual aspects that are specific to the project. In this case, the ideal aid is a **cross-reference list** containing a listing in table form of all the tags, pictures and functions that are defined in the project, as well as a central display of the **picture properties** directly in WinCC Explorer. In this way, WinCC makes the project transparent and fit for simpler configuration changes in the future.

## Configuration for multilanguage applications

The texts for the runtime application can be edited in all Primary Languages of Windows. This includes static texts and tool tips as well. A utility makes it possible to export or import all the static texts in *.csv format – either by picture or globally across the project. This makes it easy to carry out translation using a standard tool.

*WinCC Text Library with message texts in five languages*





*Configuration tool for handling large projects*

To make it easier to translate message texts, for example, a text library is available that offers in table form the terms that are used in the individual languages.

In the **Text Library**, you can enter the texts in the Windows languages that will later be used at runtime depending on the runtime language that is set at any one time.

## Configuration tool for handling mass data

For convenient and quick configuration of mass data, WinCC provides a configuration tool based on Microsoft Excel. You can read in existing projects and create new ones. In addition to process connections and process tags, you can edit measured value archives, alarm messages and the Text Library. There is a similar Archive Configuration Tool for configuring archive variables. The table format allows convenient editing, which also includes auto fill-in. Experienced users can expand their options by using macros based on VBA (Visual Basic for Applications).

## Off-line simulation

A WinCC configuration can be tested without ever having to be linked to a PLC by just using the simulator. To simulate tags, each tag can be assigned a value characteristic. When the pictures appear on the monitor during the test, it quickly becomes clear via a color change, for example, whether or not the configured animations are correct.

## Reduce start-up commissioning: on-line configuring

Modify configuring data right in the middle of a critical test phase? No problem. You can do it on-line. When the next picture is selected, the system updates the modified picture (which considerably reduces commissioning time). At the same time, the process data such as quality information messages is continuously acquired to provide complete documentation.

# SIMATIC WinCC –
# Consistently scalable – including the Web

In general, you don't create automation and IT solutions that are never going to be changed. Rather, they are subject to continuous changes that are implemented on a step-by-step basis. This includes modernizing individual plant areas, plant expansions, implementing centralized monitoring of the total plant or even of different sites in a company, and process optimization.

To be able to cope with growing requirements, you must be able to expand process visualization at any time without losing the initial investment by a complete reconfiguration. This means that **security of investment** is crucial. SIMATIC WinCC offers the required consistent scalability, from a single-user solution right through to a client/server solution with a central Historian and operator stations on the Web.

**From a single-user system to a distributed client/server solution**

The term scalable means that you can expand the number of tags in your project using **Powerpacks** on an as-required basis – and in total this is no more expensive than if you had decided to purchase the expanded solution from the start.

The **server option** allows you to set up coordinated operator stations (multi-user system) from single-user systems at any time. In this way, you can deploy a total of up to 12 WinCC servers and 32 WinCC clients per server in a contiguous plant configuration. You can configure these servers as a **distributed system**. Distributing the complete application



*Consistently scalable, from a single-user system to a client/server solution*
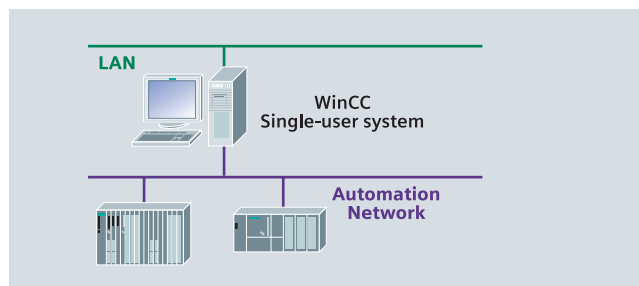


*WinCC single-user and multi-user system*
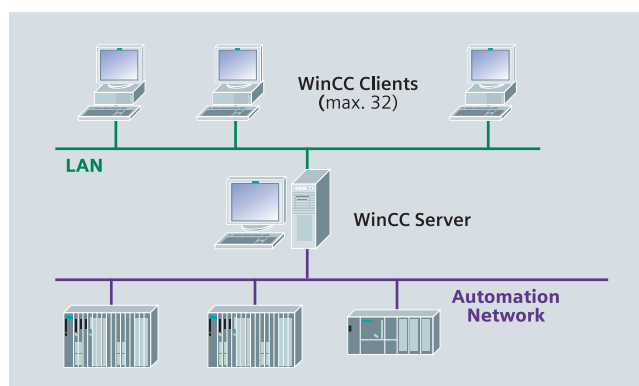


or the tasks to several servers makes possible a much higher performance profile, takes the load off the individual servers and ensures good performance. If desired, you can, for example set up a Central Archive Server (option) for **central process data archiving**. Distribution also takes into account the topology of a plant.

The complete view of the plant is implemented using WinCC clients that have access to or a view of the pictures and data of different server projects at the same time. It is even possible to use clients for online configuration. You can configure a common message and trend view of the archives of different servers for these clients.

**Operation and Monitoring without limits**

You can also extend the solution across the local network (LAN) of a site; regardless of whether you only want to be able to remotely monitor a plant area on a intermittent basis (for example in sewage plants or in station supervisory systems) or to be able to access current or historical process information (for statistical evaluations) from anywhere you want.

WinCC/Web Navigator supports full Operation and Monitoring **via the Web** – usually without needing to make changes to the project. You can set up a Web server on any WinCC client to establish a data concentrator. This means that a Web client that is connected to the Web server can **access the projects** of all the (redundant) WinCC servers (up to 12) in a plant from anywhere in the world.

User management of the Web operator stations is integrated in the application on-site. Different user access levels regulate the access rights that different people have. In addition, the system of course supports common security mechanisms for Internet operation. Using SIMATIC Logon, you can set up a central, plantwide user management system that also integrates Web clients.

With **Thin Client solutions**, you can also link robust local units (e.g. SIMATIC THIN CLIENT) and mobile clients (Personal Digital Assistants – PDAs) under Windows CE. Solutions of this type make minimal requirements of the hardware, since the application itself runs on the terminal server.

### High availability due to redundant solutions

When you have high availability requirements (minimizing non-productive time), WinCC also provides the right concepts:

■ Redundant server with the WinCC/Redundancy option

■ Server farms with a redundancy concept based on the WinCC/Web Navigator

■ Redundant process communication via S7-REDCONNECT
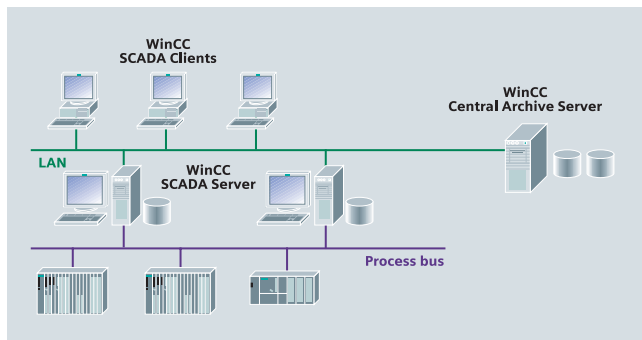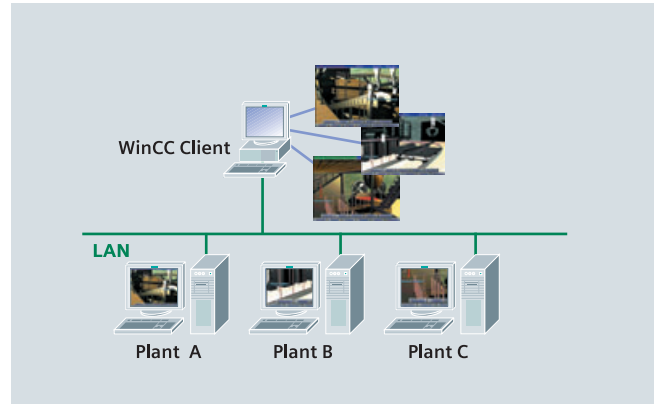


*WinCC servers distributed in accordance with the physical structure*
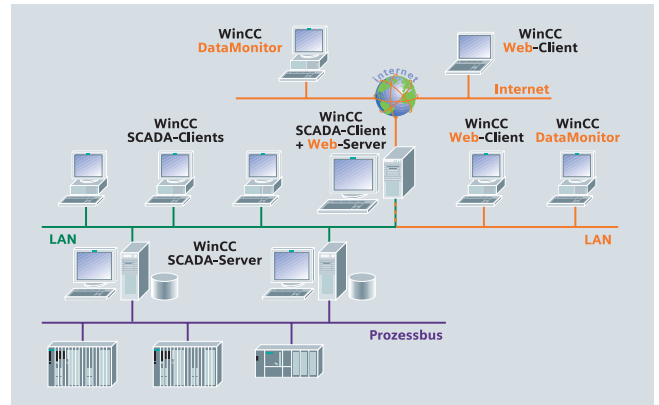


*WinCC SCADA server and SCADA clients as a Web server for different clients on the Web*



*Central process data achiving*
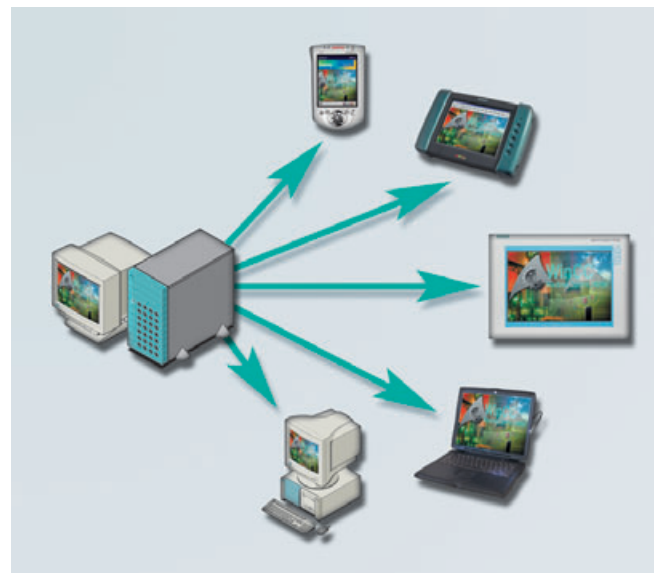


*Terminal server with Thin Clients on different platforms*

# SIMATIC WinCC –
# Open standards for simple integration



Right from the start, SIMATIC WinCC has stood for the highest levels of openness and integration, since it has consistently backed Microsoft technologies.

### Microsoft Windows
### no compromises with the operating system

WinCC was the first process visualization system on the market using 32-bit software technology under Microsoft Windows 95/NT 4.0. Today, Windows 2000 (Advanced) Server, Windows XP Professional and Windows Server 2003 represent the open standard platform for WinCC servers and clients or single-user systems. In the final analysis, this means a very safe investment for you, since you can easily keep up with innovations in operating systems.

### Microsoft SQL Server 2005 –
### a high-performance Real-Time Database

Microsoft SQL Server 2005 is integrated in the basic WinCC system – including its real-time response, performance and industrial standard. In individual cases, you can define up to 120,000 archive tags and you can store up to 10,000 measured values or 100 messages per second on a compressed basis and then analyze the data using WinCC on-board facilities. Using open interfaces (WinCC OLE-DB and OPC HDA), you can further-process archive data using any external tools you like at any time you choose.



### ActiveX Controls – open for application modules

Using OLE, you can integrate further applications in process pictures and exchange the associated data. Technology-specific or vertical market ActiveX controls can also enter the syst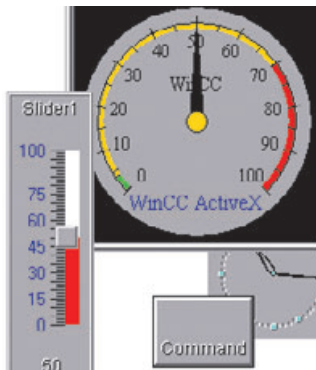em and this means that the time and effort that you have invested in engineering can also be used for your operation and monitoring tasks. There are plenty of components of this type on the market.

### Visual Basic for Applications – for individual extensions

Whenever people want to create standards for solutions that are industry or project-specific, the ability to customize the configuration tool is important. With WinCC, we integrated VBA into the WinCC Graphics Designer. VBA is a standard Microsoft product that is the user-friendly standard environment for application-specific extensions and is also incorporated into Microsoft's Office products. This means that the
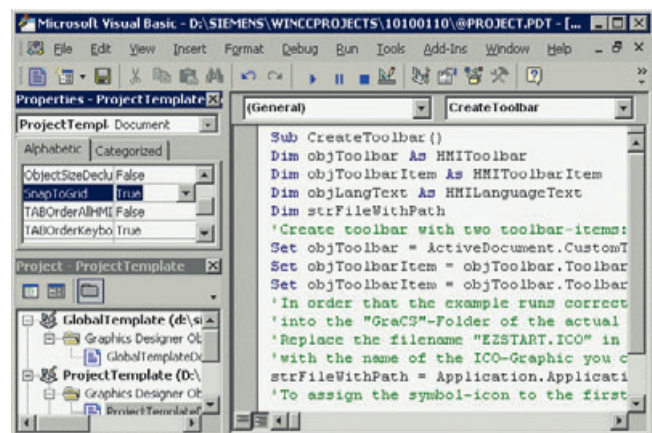


*VBA script for a project template*

Visual Basic knowledge that is available to many engineers and users is transportable to WinCC. And apart from this, standards for repeat engineering tasks save time and money! This means that you can define any menu entries or fast configuration dialogs you like for your own user-specific objects.

### VBScript or ANSI-C – it's your choice when scripting

Normally pictures, logic operations and animation are configured via simple dialogs. Scripts can also be programmed using VBScript or in ANSI-C when necessary, for example to convert values, to initiate a report or to generate operator messages.

VBScript has its own user-friendly editor with debugging support. The scripts themselves have access to the proper-
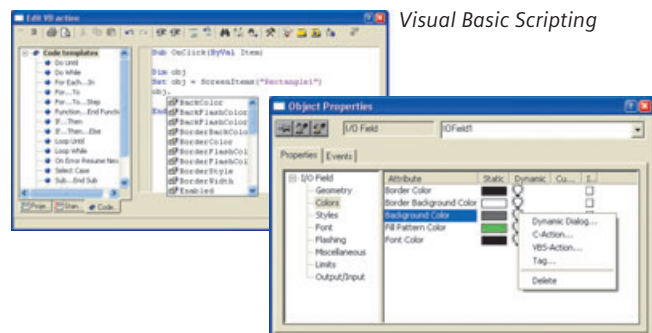


*Visual Basic Scripting*

ties and methods of all WinCC graphics objects, to ActiveX controls and to the object model of other manufacturers' applications. This allows you to control the dynamic behavior of objects as well as to easily establish connections to other manufacturers' applications, for example to Microsoft Excel and SQL databases).

## Open programming interfaces – C-API

Would you like more individual applications? The WinCC function modules are open due to API interfaces that allow access to the data and functions of the configuration and runtime system. This means that you can use WinCC configuration and runtime functions in your scripts or even develop standalone applications with direct access to WinCC.
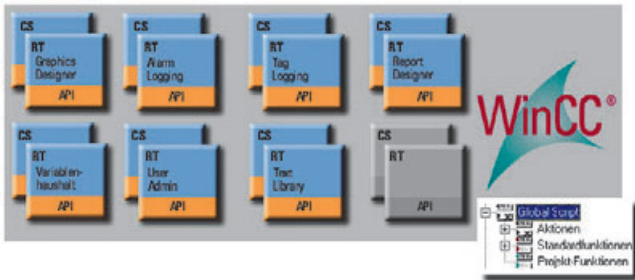


And using the Open Development Kit (ODK) accessing the programming interfaces is really easy.

## OPC: Openness, Productivity, Collaboration – for non-proprietary communication

In WinCC, non-proprietary communication in the field of automation has always been very important. As an **OPC DA** client, WinCC can log on locally or across the network in the case of lower-level controllers for current process data and have this data sent to it from the associated OPC DA server on a cyclical basis. In the other direction, the WinCC OPC DA server can make available current process data to other OPC compatible applications like Microsoft Excel, for example, for further processing. Using **OPC XML DA**, this is even possible on a cross-platform basis (different operating systems) across the Web between WinCC and Office applications, ERP/PPS systems (e.g. SAP/R3) or B2B portals.

You can implement access to WinCC archive data via **OPC HDA** (Historical Data Access). As an HDA server, WinCC makes available historical data from the WinCC archive system to other applications. The OPC client (e.g. a reporting tool) can specify the start and end times of a time interval and thus selectively request the data to be transferred. Apart from this, the client can request already conditioned data from the HDA server, i.e. actively trigger data compression before the data is transferred.

In **OPC A&E**, the system displays a WinCC message as an alarm and, together with all the ancillary process values, passes it on to any subscribers on the production or company management levels. Due to the filter mechanisms and subscriptions, the system only transfers selected, changed data. It is, of course, also possible to carry out acknowledgement at the MES or ERP level.

# SIMATIC WinCC –
# Integrated Process Historian for IT & Business Integration

SIMATIC WinCC integrates a powerful, scalable Historian based on Microsoft's SQL Server 2005 in the basic system. This offers users a wealth of options ranging for archiving and evaluation.

## Archiving ...

- High-performance archiving of current process data and events
- Long-term archiving with high levels of data compression and backup function
- Central information exchange in the form of a cross-company Historian server (in future as redundant solution available)

Process data and events are archived in the form of process value, alarms and user archives with high levels of performance at up to 10,000 measured values per second and 15,000 messages within 10 seconds in case of a message overload. The efficient compression functions mean that the memory requirement is very low. You can export completed individual archives (e.g. a weekly archive) to the long-term archive server (backup server).

Up to 11 WinCC servers, remote OPC DA servers or remote databases are used as the data sources. If you have high availability requirements, you can set up consistently redundant solutions using redundant WinCC, archive and backup servers.

In the basic WinCC system, you can configure 512 archive variables. Powerpacks allow you to increase this number to up to 120,000 tags.

## ... and evaluation

You can display the data from the WinCC archives (Historian) via the WinCC process pictures using the integrated WinCC Trend Control or WinCC Alarm Control (including statistical calculations), or you can use special tools with WinCC options (e.g. WinCC/DataMonitor) and WinCC add-ons.

This means that a large number of different clients are available for evaluations:

- WinCC SCADA clients for Operating & Monitoring (and engineering)
- WinCC Web clients with full O & M functionality via the Web
- WinCC DataMonitor clients as an information portal for current process views using Microsoft Internet Explorer, evaluations using Microsoft Excel, creating, displaying and distributing reports
- Analysis clients based on WinCC/Connectivity Station with free access to current and historical data (e.g. via OPC or WinCC OLE-DB).
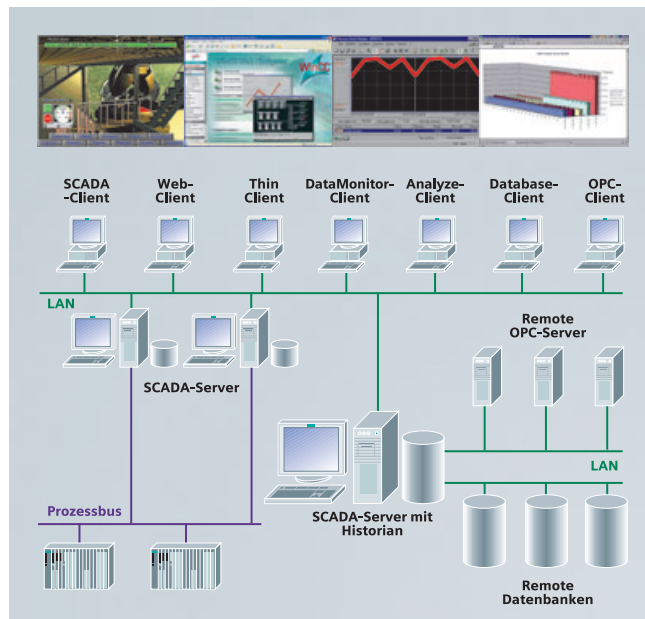


*Historian based on WinCC – Process data archiving and information exchange*

# SIMATIC WinCC –
# More transparency for production using Plant Intelligence

Ongoing globalization and increased competition have led on the one hand to an intense process of concentration; on the other hand, these factors demand a consistent flow of information across all the levels and sites of an organization. SIMATIC WinCC provides the appropriate solution for this: Scalable client/server systems for process visualization, options for IT & Business Integration and Plant Intelligence – the basis of high levels of transparency and process optimization with a rapid return on investment.

**Plant Intelligence** is based on the intelligent use of information to improve a company's processes. This is intended to reduce the costs of a plant, to prevent scrap, to have better rates of utilization of production facilities and in the final analysis to guarantee greater effectivity and profitability for the company.

WinCC is the best jumping off point for this, since WinCC has an **integrated Historian** to acquire important production data. Using intelligent functions and tools, it is possible to condition this process data into **information that is relevant to decision-making** and to make it available on a cross-company basis at any time and anywhere – to operators as well as to plant managers or to anybody else in the company.

In the basic system, WinCC provides a wide range of display and evaluation functions, for example statistical functions for message und measured value archives. The WinCC options for Plant Intelligence and for IT & Business Integration make available additional **intelligent tools for optimizing production** by means of Plant Intelligence:

- **WinCC/DataMonitor** – for displaying, analyzing, evaluating and distributing current process status conditions and historical data

- **WinCC/DowntimeMonitor** – for acquiring and analyzing downtimes in machine- or line-oriented production facilities and deriving from this data plant-specific parameters (KPIs)

- **WinCC/ProcessMonitor** – Management Information System and online quality analysis tool of calculating customer-specific KPIs

- **WinCC/Connectivity Pack** – access for other applications to WinCC archives or to current process values and messages

- **WinCC/IndustrialDataBridge** – linking external databases, Office applications and IT systems

With the integration of Plant Intelligence applications from the machine up to the enterprise level, Siemens Automation & Drives (A&D) is offering a complete and scalable solution from one source. An advancement from an inexpensive, scalable entry-level system on the basis of the process visualization system SIMATIC WinCC all the way up to a comprehensive optimization solution on the MES level with SIMATIC IT is now seamlessly possible. Plant Intelligence links the SCADA level with the MES level and in doing so provides a greater transparency in the production through an efficient acquisition, archiving, compression, analysis and distribution of production data.

The linking and integration of SCADA and MES result in an enormous advantage for the customer. The customer can initially – just like before – expand his/her existing SIMATIC WinCC SCADA solution with Plant Intelligence and can extend the plant transparency with additional expansions on the MES or enterprise level. SIMATIC IT is capable of correlating and analyzing parameters such as key performance indicators across multiple plants; thus, production data such as work orders, genealogy and batch data can also be analyzed.
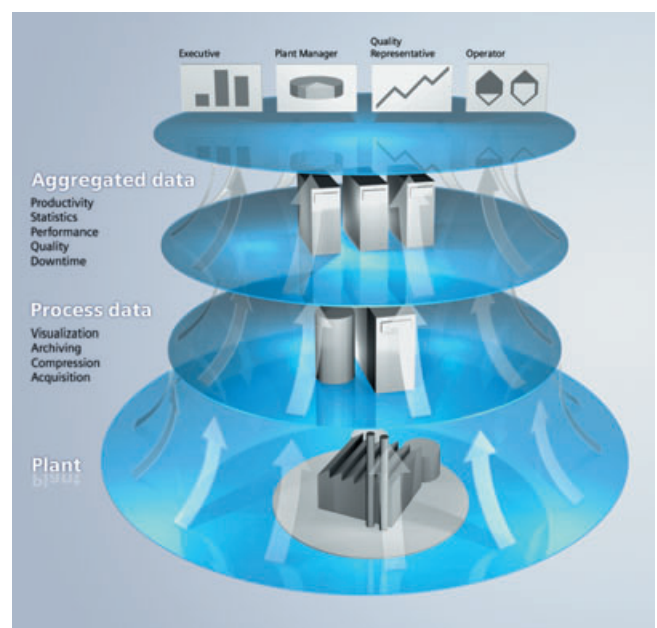


*Process Visualization using Plant Intelligence*

# SIMATIC WinCC –
# Part of Totally Integrated Automation

**Saving engineering and lifecycle costs**

TIA allows you to completely integrate individual automation components – ranging from controllers, distributed peripherals and drive technology through Operating & Monitoring up to the production management level. In this connection, you always benefit from the unique consistency. In other words: You can reduce your engineering costs for automation solutions – with a corresponding reduction in lifecycle and total costs.

As a part of TIA, SIMATIC WinCC uses identical configuration tools under Windows, accesses common data, and communicates consistently. This means, for example, that WinCC uses the lists of tags and messages of the SIMATIC controller and its communications parameters. This avoids time-consuming and expensive multiple inputs and the sources of errors – right from the start.

**Integrated diagnostics increase productivity**

Totally Integrated Automation offers integrated diagnostics as a significant system feature. In conjunction with other SIMATIC components, SIMATIC WinCC also supports **system and process diagnostics** in ongoing operation:

- Entering STEP 7 hardware diagnostics directly from WinCC
- Calling STEP 7 blocks from WinCC pictures
- System diagnosis using Web technology with WinCC Scope
- Diagnosing the communications connection using WinCC Channel Diagnosis
- Reliable process diagnostics with WinCC/ProAgent

**System diagnostics**

You can deploy a WinCC operator station on an additive basis for preventive maintenance (SIMATIC Maintenance Station option). Users configure the maintenance station in compliance with the Totally Integrated Automation approach by choosing in STEP 7 the automation systems that are to be mapped to a hardware configuration. On this basis, the maintenance station detects the equipment that belongs to the plant and creates an image with uniform symbols for maintenance in WinCC.

**Diagnosing system errors** includes all the components that are connected to the controller via PROFIBUS – without needing any configuration time and effort on the WinCC side. At configuration, the system automatically takes all the relevant diagnostics data from the diagnostics data that STEP 7 stored. At runtime, the system automatically issues a system message to WinCC in the case of an error. The SIMATIC
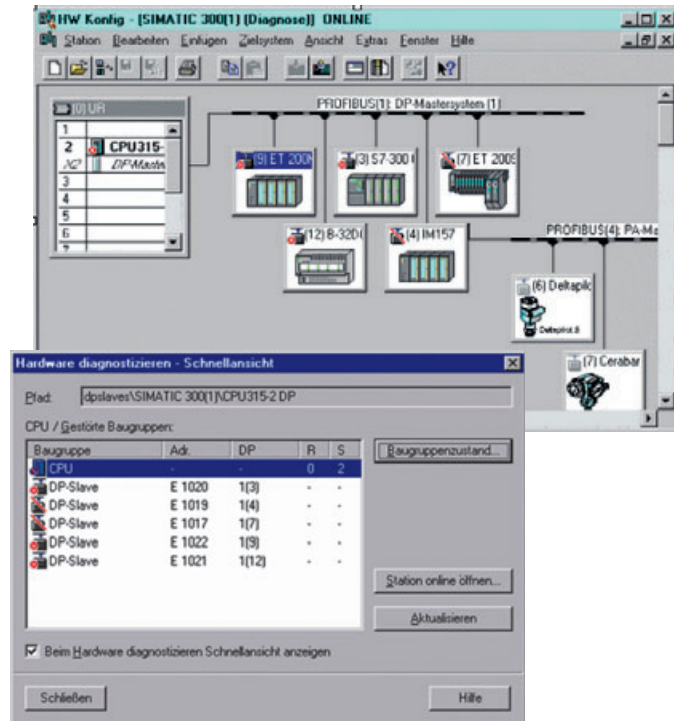


*Calling STEP 7 hardware diagnostics from WinCC*

Maintenance station is based on the diagnostics of system errors, too.

**WinCC Scope** carries out diagnostics of the WinCC station and its environment across the Web. With communications in particular, faults often occur that are difficult to analyze. **WinCC Channel Diagnosis** helps you to quickly detect and eliminate errors.

**Process diagnostics**

The process diagnostics messages from the S7-PDIAG and S7-GRAPH controller display irregularities in the case of an error using WinCC/ProAgent in WinCC – without needing any further configuration time and effort, or any additional diagnostics facilities. This means that WinCC supports you in an effective way in localizing and eliminating errors, which considerably reduces machine and plant down times.

# SIMATIC WinCC –
# Process communications

**Number of controllers that can be connected**

When communicating via Industrial Ethernet with a CP1613 communications processor and a maximum frame length of 512 bytes you can connect up to 60 controllers SIMATIC S5/505. or up to 64 controllers SIMATIC S7. Up to 8 (with CP 5611) or up to 44 (CP 5613) PLCs can be connected via PROFIBUS. The use of Industrial Ethernet is recommended for approx. 10 PLCs and more.

**Mixed operation with different controllers**

Due to their multiprotocol stacks, CP 1613® and CP 5614® communications processors make it possible for you to run two protocols in-parallel, e.g. for mixed operation of different controllers via a bus cable. WinCC supports the operation of two communications processors of the same type only in conjunction with the following channels: SIMATIC S5 Ethernet Layer 4 (2 x CP 1613), SIMATIC S7 Protocol Suite (2 x CP 1613, 2 x CP 5613) and PROFIBUS DP (4 x CP 5613; max. 122 slaves per CP 5613). In addition to communication via Industrial Ethernet CP 1613 or PROFIBUS CP 5613 one CP 5511 or CP 5611 can be used for communication with SIMATIC S7 via MPI.

**Client/server communication**

The TCP/IP protocol is used to handle communications between clients and server, normally over a separate LAN. For small projects with a relatively low message volume, a SIMATIC NET Industrial Ethernet can be implemented for both the process and the client-server communication.

**Communication redundancy**

The S7-REDCONNECT software package is required for redundant connection of PCs to SIMATIC S7 via 2 x Industrial Ethernet. This connects the SIMATIC S7 to applications on the PC, e.g. SIMATIC WinCC. Complete communications redundancy can also be achieved by setting up optical rings.

**Interfacing to non-SiemensPLCs and other systems**

OPC is recommended for interfacing to non-Siemens PLCs and other systems. For the latest information about OPC servers from a wide range of different manufacturers, see:

http://www.opcfoundation.org/05_man.asp

WinCC supports the standards:

- OPC Data Access Client and Server 1.0 a, 2.0, 3.0
- OPC XML Data Access V1.0 Client (basic system) and Server (Connectivity option package)
- OPC HDA V1.1 Server (option: Connectivity Pack)
- OPC A&E V1.02 Server (option: Connectivity Pack)

| Protocol | Description |
|---|---|
| **SIMATIC S7** | |
| SIMATIC S7 Protocol Suite | Channel DLL for S7 functions via MPI, PROFIBUS or Ethernet Layer 4 + TCP/IP |
| **SIMATIC S5** | |
| SIMATIC S5 Ethernet Layer 4 | Channel DLL for S5 Layer 4 communication + TCP/IP |
| SIMATIC S5 Ethernet TF | Channel DLL for S5 TF communication |
| SIMATIC S5 Programmer Port AS511 | Channel DLL and driver for serial communication with S5 via AS511 protocol to programmer port |
| SIMATIC S5 Serial 3964R | Channel DLL and driver for serial communication with S5 via RK512 protocol |
| SIMATIC S5 PROFIBUS-FDL | Channel DLL for S5-FDL |
| **SIMATIC 505** | |
| SIMATIC 505 Serial | Channel DLL and driver for serial communication with 505 via NITP/TBP protocol to SIMATIC 535/545/555/565/575 |
| SIMATIC 505 Ethernet Layer 4 | Channel DLL for 505 Layer 4 communication |
| SIMATIC 505 TCP/IP | Channel DLL for 505 TCP/IP communication |
| **Cross-vendor** | |
| Windows DDE | Channel DLL for DDE communication, WinCC can acquire data from DDE server applications |
| OPC client | Channel DLL for OPC communication, WinCC can acquire data from OPC server applications |
| OPC server | Server applications for OPC communication; WinCC provides process data for OPC clients |
| PROFIBUS FMS | Channel DLL for PROFIBUS FMS |
| PROFIBUS DP | Channel DLL for PROFIBUS DP |

# SIMATIC WinCC –
# Technical specifications

| Type | SIMATIC WinCC V6.2 |
|---|---|
| Operating system | Windows XP Professional SP2/ Windows 2003 SP1/R2Server and Windows 2000 Professional SP4 Web Client/DataMonitor Client additionally: Windows NT4.0 SP6a/ Windows XP SP2, Windows Server 2003 terminal services |
| **Hardware requirements for PC** | |
| **CPU** Minimum<br><br>Recommended | Single-user system/server: Pentium III, 1 GHz · Central archive server: Pentium IV, 2 GHz Client: Pentium III, 300 MHz · Web client/DataMonitor client: Pentium III, 300 MHz Single-user system/server: Pentium IV, 2 GHz · Central archive server: Pentium IV, 2,5 GHz Client: Pentium III, 1 GHz · Web client/DataMonitor client: Pentium III, 1 GHz |
| **RAM (main memory)** Minimum<br><br>Recommended | Single-user system/server: 512 MB/1 GB · Central archive server: 1 GB Client: 512 MB · Web client/DataMonitor client: 256 MB Single-user system/server: ≥ 1 GB · Central archive server: ≥ 2 GB Client: 512 MB · Web client/DataMonitor client: 512 MB |
| **Functionality/quantity framework** | |
| Messages (number) Message text (number of characters) Message archive Process values per message Message surge, max. | 50,000 10 x 256 > 500,000 messages[1] Central archive server: 100/s · Single-user system/server: 10/s Central archive server: 15,000/10 sec. every 5 min Single-user system/server: 2,000/10 sec. every 5 min |
| **Archives** Archive data points Archive types Data storage format Measured values per second, max. | Max. 120,000 per server[2] Short-term archive with and without long-term archiving Microsoft SQL Server 2005 Central archive server: 10,000/s · Single-user system/server: 5,000/s |
| **User Archives** Archives (recipes) Data records per user archive No. of fields per user archive | Determined by system[1] 65,536[4] 500[4] |
| **Graphics system** No. of diagrams, objects and pictures | Determined by system[1] |
| **Process variables** | 64 K[5] per server |
| **Trend curves** Curve windows per display Curves per curve window | 25 80 |
| **User administration** User groups No. of users Authorization groups | 128 128 999 |
| **Configuration languages** | 5 European (Ger., Eng., Fr., Ita., Sp.), 4 Asian (simpl.+trad. Chi. / Kor. / Jpn) |
| **Runtime languages** | 9 per project |
| **Protocols** Message sequence reports (simultaneous) Message archive reports (simultaneous) Application reports Report lines per body Variables per report | 1 per server/single-user station 3 Determined by system[1] 66 300[6] |
| **Multi-user system** Server Clients for server with operator terminal Clients for server without op. terminal | 12 4 32 WinCC clients + 3 Web clients or 50 Web clients + 1 WinCC client |

[1] Dependent on available memory
[2] Dependent on the number of licensed archive variables
[3] Dbase III only with TagLogging short-term archives
[4] The product of number of fields and number of data records must not exceed 320,000

[5] Depends on the number of licensed PowerTags
[6] The number of variables per report depends on the performance of the process communication

# SIMATIC WinCC/Server –
# Setting up client/server systems

The application of the server option makes a WinCC single-user system a powerful client/server system. It allows multiple coordinated operator stations to be operated together with networked automation systems.

A server supplies up to 32 connected clients with process data, archive data, messages, screens and reports. This requires a network connection (TCP/IP) between the server computer and the connected clients.

### Servers and clients of your choice

Depending on the plant size, up to 12 servers can be employed. In general, the plant is controlled by **WinCC (SCADA) clients** that access one server or that possess a central view to multiple servers (see also "distributed system"). The clients only require the smallest runtime license (RT128) or complete license (RC128) if you also want to configure on the client. This makes it possible to configure reasonably priced operator and configuration stations in a network. You can of course carry out configuration online without affecting the function of the servers and operator stations.

Operator stations are also possible in the form of **Web clients**. In heterogeneous configurations with SCADA and Web clients, this yields, amongst other things, the following performance profile limits (variations are possible).

- 50 WinCC Web clients and one WinCC SCADA engineering client, or
- 32 WinCC SCADA clients and three WinCC Web clients.

### Distributed system

Thus, in a complex installation, WinCC can be configured as a **distributed system**, in accordance with the **physical structure** of the plant (e. g. body works, paint shop), or on a **functional basis**, e.g. message server, archive server, etc. Distributing the complete application or the tasks to several servers makes possible a much higher performance profile, takes the load off the individual servers and ensures good
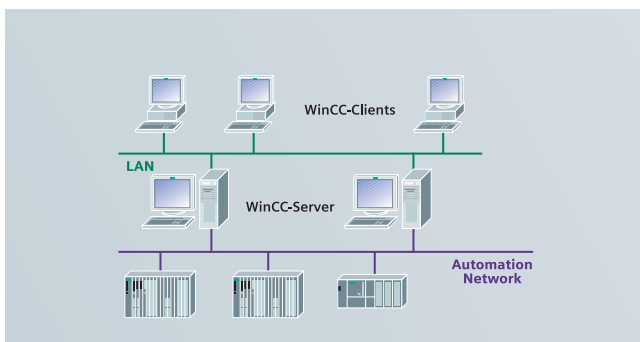
**Key benefits**

- Setting up a client/server system – for operating and monitoring relatively large plants with up to 32 coordinated clients
- Distributed functions or applications on several servers – with high performance profiles at high system performance levels
- Overview for the entire project –with access to all the servers in the plant from operator station
- Favorably priced configuration on the client (the lowest license is necessary)

performance. Distribution also takes into account the topology of a plant.

A special example of a functional distribution is an archive server (option package: WinCC/Central Archive Server) that is used in the sense of a Process Historian as a central cross-company information exchange and that can be accessed using a Connectivity Station for example.

The complete view of the plant is implemented using clients that have access to or a view of the screens and data of different server projects at the same time. You can configure a common message and trend view of the archives of different servers for these clients.

*Multi-user system with up to 32 clients connected to each server*
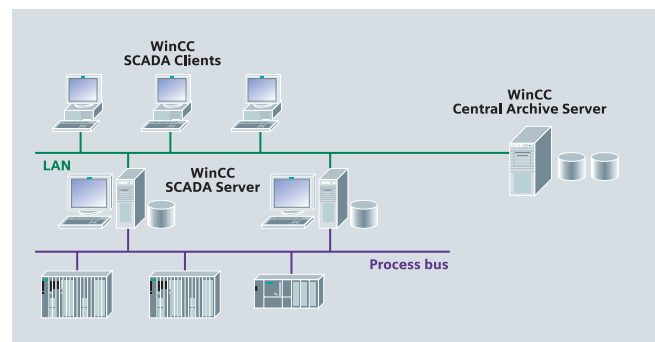
*Distributed system with central archive server*

# SIMATIC WinCC/Web Navigator –
# Operation and Monitoring via the Web

## Key benefits

- Operating and Monitoring over long distances with up to 50 clients at the same time

- Rapid update rates due to event-driven communications

- Clients tailored in an optimum way for Operating & Monitoring, evaluation, service & diagnostics

- Thin-client solutions on different platforms (PC, local Operator Panels, mobile PDA)

- Web and terminal clients can be added at any time

- Minimal maintenance costs due to central software administration

- Normally application of configuration data for the Web without changing it

- Increased security by separating WinCC and Web servers

- Individual access permissions with cross-plant user management

- High internet security standards

The WinCC/Web Navigator allows you to visualize and operate your plant via the Internet or your company's Intranet or LAN – without needing changes in the WinCC project.

This means that the Web Navigator offers the same archive display, operator input and access options as the local operator stations. This also means that the displayed process screens can contain Visual Basic or C scripts for dynamic



*Operating and Monitoring of a plant using a Web browser*

sequences, that you can switch over the user interface to as many languages as you like and that the operator stations on the Web are integrated into the local user management.

### New areas of application

Apart from typical uses of the Web Navigator in the Wide Area Network (WAN) field, you can also use the Web Navigator for applications that must be implemented with a minimum cash investment. This includes in particular applications that have a highly distributed structure (water / sewage, oil and gas), or in which there is only intermittent accessing of process information (building management). In addition, you can also use Web clients as normal operator stations on the LAN.

### Web server and clients

For such a configuration you need a **Web Navigator Server** on which the SIMATIC WinCC software is installed as a single-user or server version and a **Web Navigator Client** on a Windows computer. The client makes possible operating and monitoring of an ongoing WinCC project using MS Internet Explorer V6.0 or higher) without you needing to have the WinCC basic system on your computer.

You can set up a Web server like this on any WinCC (SCADA) client. This means that a Web client that is connected to the Web server can **access from anywhere in the world the projects** of all the maximum of 12 (redundant) WinCC servers in a system. In this connection, the Web client also switches over on a transparent basis via redundant lower-level WinCC servers. If you start several instances of the browser on the Web client, you can also view several plants, i.e. **several Web servers** at the same time.

### Security concept as required

Separating WinCC servers and Web servers ensures more security and availability, which you can increase even further by means of standalone Web servers on two independent SCADA clients. The operator stations on the Web are included in the plant's local user management. Different user permissions regulate which users have which access rights.

On accessing the Web server, each client must identify itself. In accordance with the client's configured access rights, it can either only observe the plant or only operate it. Apart from this, Web Navigator supports all common security mechanisms that can be used for applications on the Internet, e.g. routers, firewalls, proxy servers, Secure Socket Layer (SSL) and Virtual Private Network (VPN) Technologies.
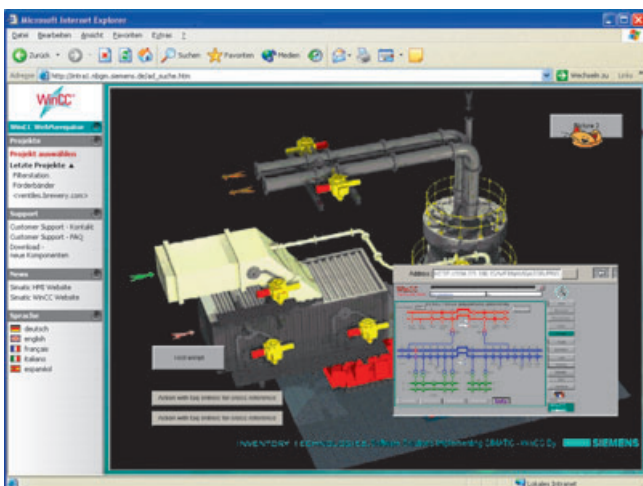
## Thin-Client solutions

Using **Thin-Client solutions**, you can also link simple PCs under a Windows operating system (e.g. Windows 9x/ME), robust local equipment (e.g. SIMATIC THIN CLIENT) and mobile clients (PDAs Personal Digital Assistants) under Windows CE. Solutions like this only make low demands on the hardware, since the application itself, i.e. the Web Navigator client, runs on the terminal server under Windows 2000, which you can connect up to 25 thin clients to.

By contrast with typical Web Navigator installations, the thin clients are generally located on the same LAN as the server. However, accesses are also permissible via WAN, RAS and even the Intranet/Internet. You can integrate mobile equipment using different media, like mobile radio connections or Wireless LAN.

## Server farms with load balancing

If you need a very large number of Web operator stations at the same time, you can configure server farms with several Web servers. For this, you need a load-balancing license for the Web servers involved. Load Balancing allows you to balance the load such that new Web clients are automatically assigned to the Web server with the lowest loading level at the time. In this connection, all the Web servers have access to the same WinCC project and can each have up to 50 Web clients assigned to them. This yields a total of several hundred operator stations on the Web. If the assigned Web server fails, the clients try to connect to another Web server in the server farm.

## Licenses of your choice

You can install the Web Navigator client software free of any licensing fees. To use the Web Navigator server, you need an
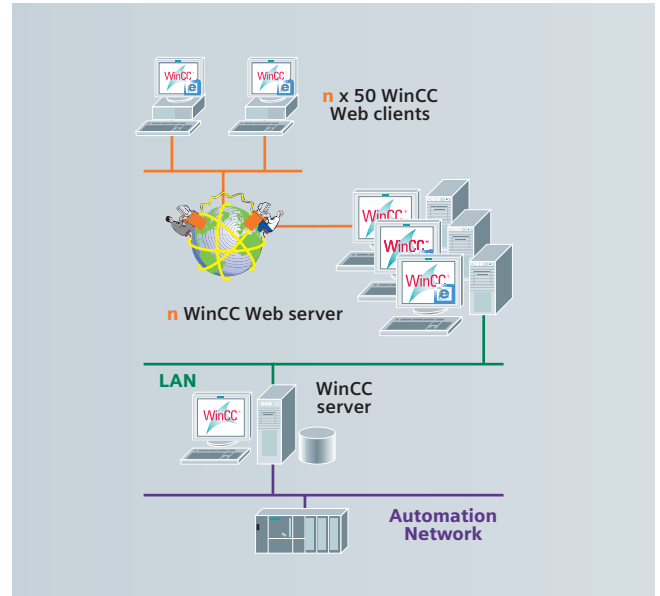


*Web server farms with many Web clients*

appropriate (standard) license. There are licenses for 3, 10, 25 or 50 clients **accessing the Web server at the same time**.

**Diagnostics clients** have guaranteed access to all Web servers with standard license or a cost-minimized **Diagnostics Server license**. Diagnostics clients are ideally suited for system integrators who are responsible for maintaining and servicing systems that are widely scattered.
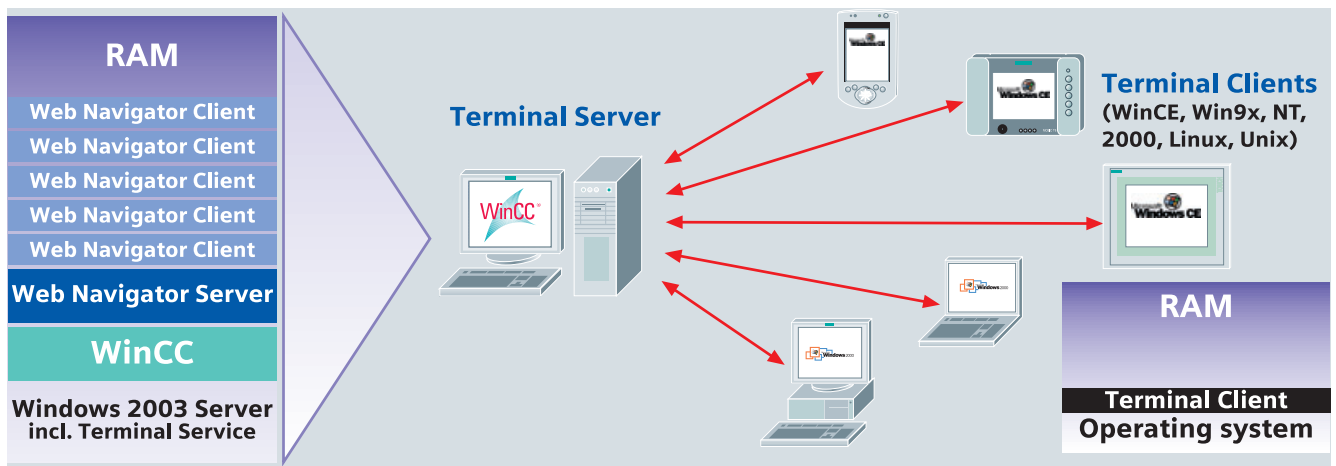


*Thin clients based on different operating systems connected to a Web Navigator Server*

# SIMATIC WinCC/DataMonitor –
# Visualizing processes, analyzing data and distributing information

**Key benefits**

- Displaying and analyzing current process status conditions and historical data on office computers using standard tools like Microsoft's Internet Explorer or Microsoft Excel

- No additional time and effort for configuration, since you can directly use pictures from the WinCC project

- Evaluation via centrally administered templates for detailed analyses of company processes (e.g. reports, statistics)

- Creating event- or time-controlled reports

- Information from the process can be grouped on an individual basis at runtime (information portal) and distributed to different people by e-mail

The **WinCC/DataMonitor** is an important component for plant intelligence applications. The DataMonitor is used for the display, analysis, interpretation and distribution of current process states and historical data from the process database. With the DataMonitor, WinCC process data can thus be made available to all functional levels in the enterprise via the Web.

Powerful tools for the depiction and interpretation of current process states and historical data (measured values, messages, user data) from the process database enable the production to be efficiently monitored and analyzed as well as reports to be created and distributed to the appropriate persons. For the display, a DataMonitor client can be set up on any office PC. The data provider – a WinCC/Web Navigator server or a WinCC/DataMonitor server – is installable on any WinCC single-user system, WinCC server or WinCC client.

**The DataMonitor and its tools**

- **Process Screens**
  Purely for monitoring purposes of WinCC process screens
- **Trends & Alarms**
  Display and analysis of archived process values and alarms in trends or tabular form
- **Excel Workbooks**
  Display of archived process values in an Excel table for the analysis and storage on the Web or as print template for reports
- **Published Reports**
  Generation of time-controlled or event-controlled reports in Excel format or as Portable Data File (PDF)
- **Webcenter**
  Central information portal for the access to WinCC data via user-specific views

The function **Process Screens** is used purely for monitoring purposes and for the navigation across WinCC process screens with the MS Internet Explorer as a so-called "view-only client". In doing so, the WinCC/DataMonitor employs the same mechanisms as the WinCC/Web Navigator, e.g. for the communication, the user administration, the display of screens.

**Trends and Alarms** is a tool for displaying and analyzing archived WinCC process values and alarms. A predefined page already contains the displays for the process value table, the corresponding trends, the alarm table and the alarm hit list with the associated operator functions. Also included are the statistics functions from WinCC for process value patterns and alarms (e.g. average, standard deviation, variance). Tables only have to be linked with the desired WinCC archive data (measured values or alarms). Chosen data can also be exported to a CSV file and be processed further at a later time (e.g. compression).

The **Excel Workbooks** are a reporting tool for the display of alarms and current or archived process values in an Excel table. The data can then be analyzed via Excel functions and also be graphically formatted and summarized in a report. Once Excel workbooks have been created, they can be published and made available to the Intranet/Internet, or be used as templates for reports to be automatically generated.
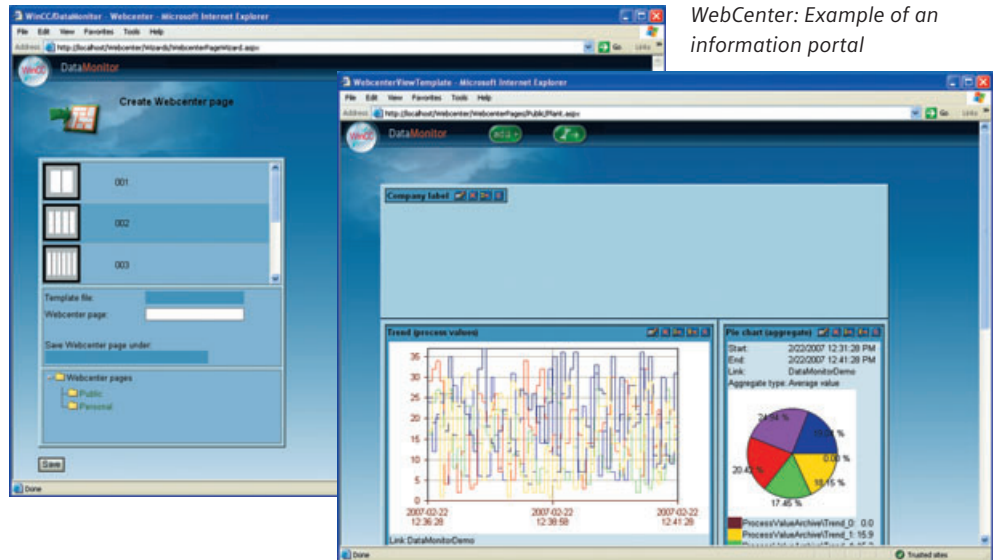
**Published Reports** automatically generate print jobs from WinCC reports and prepared Excel workbooks. The reports are started time-controlled (e.g. at the end of a shift) or event-controlled (e.g. upon the change of a WinCC tag) and can be distributed by e-mail. Reports created by Excel are saved as XLS file. The corresponding file created by the WinCC Report Designer is stored in PDF format. and can be further processed and analyzed afterwards.

The **WebCenter** is the central information portal for the access to WinCC data via the Intranet or Internet. In the WebCenter, the user can arrange WinCC process data, alarms and process screens to form any screen view for different groups of persons, e.g. pie charts with quantity counters for the management, or temperature patterns for maintenance technicians. By means of these views, WinCC data can be compared, analyzed, interpreted and if necessary also exported over absolute or relative time periods.

In a WebCenter page, the user can compose own screen views from so-called WebParts (e.g. process value tables, trends, alarm tables, statistics displays, etc.) and save them. Thus, different information of a plant or process can be generated for different functional levels of an enterprise, e.g. for the quality control, the plant operator or the service personnel, always offering the facts clearly.

## Selectable licensing

The licensing takes place sever-based, i.e. is made at the Web Navigator server or DataMonitor server. Depending on the selected license, the DataMonitor software package for the DataMonitor server contains either 1, 3, 10, 25 or 50 client licenses. The number of client licenses denotes the maximum number of clients that can be active at the same time, whereas in principle, any number of clients can be connected. For upgrading the number of simultaneously active clients, Powerpacks are offered.



*WebCenter: Example of an information portal*



*Bar chart*

*Graphic display*

*Pie chart*

*Trend chart*

*Links*

*Alarm table*

*Favourites*

*Table with statistics*

*Alarm hitlist*

*WebCenter: WebParts for the design of the pages in the WebCenter*

# SIMATIC WinCC/DowntimeMonitor –
# Detection and analysis of downtimes

## Key benefits

■ Complete transparency about the plant and machinery as the basis of optimizing plant productivity, this means
  – Avoiding disturbances and bottlenecks
  – Increasing availability

■ Deriving specific parameters (KPI)

■ Integrating appropriate display instruments (controls) in WinCC process pictures

■ Can be used for individual machines up to complete production facilities

■ Distributing evaluations to different people across the Web

With the **WinCC/DowntimeMonitor**, the machine data management software, downtimes in machine-oriented or line-oriented production facilities can be detected and analyzed centrally. For individual units, machines or entire production lines, the following specific parameters can be derived from this:

■ OEE (Overall Equipment Efficiency)

■ MTBF (Mean Time Between Failures)

■ MTFF (Mean Repair Time)

■ And other so-called Key Performance Indicators (KPIs)

In doing so, production equipment can be defined individually by plant.

Error cause analyses provide information about the frequency and duration of machine or plant downtimes. Corresponding indicators can easily be integrated into the WinCC process screens.

In the DowntimeMonitor, the time model of the production equipment is determined from the production times, maintenance times and downtimes. Via a shift calendar, the shifts can also be included in the analysis. All plant statuses relevant for the analysis are parameterized in a detailed reason tree. The acquired data provides information about the efficiency of individual machines and entire production plants. The transparency of the data makes it possible to quickly respond to malfunctions and to take corrective measures, which again increases the machine availability.

All analysis results are integrated into the WinCC screens in the form of controls. Here, several indicators are distinguished between:

■ Gantt and Pareto charts

■ Bar or column charts

■ Trends or tables

The displayed data can be processed with WinCC and the WinCC options, and be distributed to different persons.



*DowntimeMonitor – Key performance indicators at a glance*
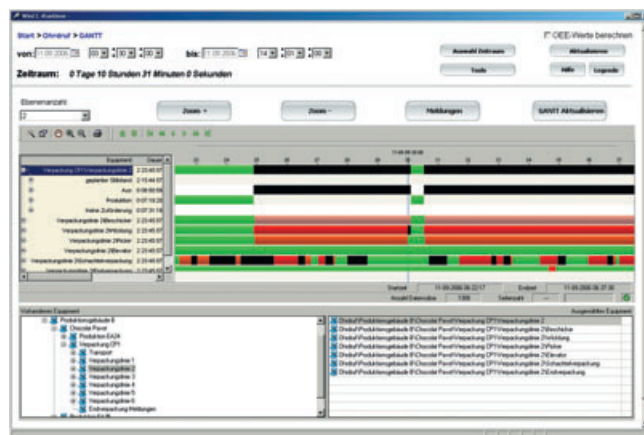


*DowntimeMonitor – Analysis via Gantt charts*

# SIMATIC WinCC/ProcessMonitor –
# Management information system and online quality analysis

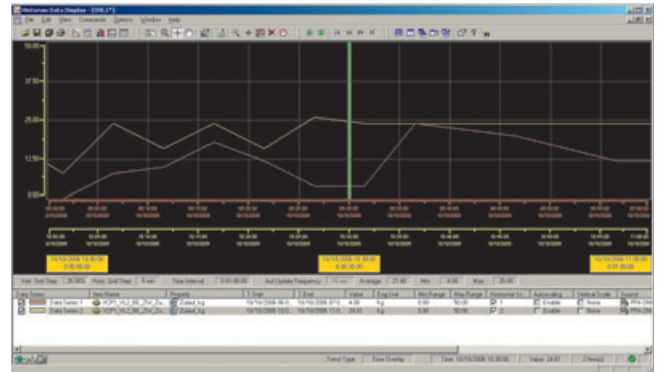*ProcessMonitor – Trend Window for the comparison of KPIs*

The WinCC/ProcessMonitor is employed for the collection, manipulation, analysis and storage of process values. The integration into WinCC assures complete transparency across all machine and plant data, which is the basis for optimizing the plant productivity.

In doing so, only **freely definable**, company-specific key performance indicators – such as the speed of the workpiece processing (ultimately the motor speed) – are determined and compared in relation to the quality of the product created. Furthermore, the appearance of typical malfunctions is analyzed, through which bottlenecks in the production process can be identified.

The depiction of the results takes place within WinCC via an expanded trend display **(Trend View)**, which also contains values acquired by the ProcessMonitor. These values can be displayed as a standard trend or as a trend with time overlaps. Thus, the comparison of key performance indicators over different time frames (e.g. during multiple shifts) is possible in one trend window. Another display type are X/Y trend profiles **(X/Y Trend Views)**, in which any two values are directly correlated.

An alarm analysis **(Message View)** with the aid of the ProcessMonitor offers – in addition to the standard WinCC message display – the depiction of filtered results in the form of bar charts.

If own values are calculated by the ProcessMonitor on the basis of the process data provided by WinCC, these values can be transferred back to WinCC for further processing.



*ProcessMonitor – Management information at a glance*
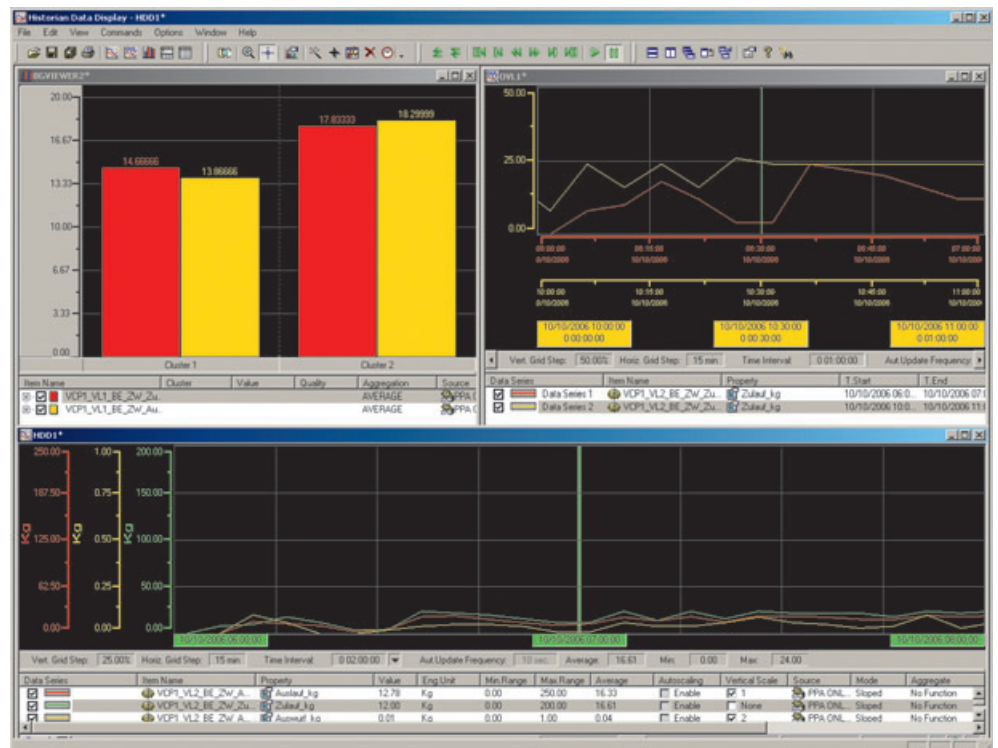
# SIMATIC WinCC/IndustrialDataBridge –
# Linking to databases and IT systems

## Key benefits

- Connecting the automation level to the IT world

- Integrating systems made by different manufacturers using a large number of different standard interfaces (amongst others OPC, OLE-DB, office formats)

- Simple, favorably priced configuration using standard software (without programming)

- High-performance data exchange between several systems at the same time

WinCC/IndustrialDataBridge uses standard interfaces to link the automation level (controls) to the IT world and to ensure a **flow of information in both directions**. Examples of these types of interfaces include OPC in the field of automation and SQL database interfaces in the IT world. You can integrate systems made by different manufacturers using a large number of different standard interfaces. You carry out configuration (without programming) on a favorably priced basis using a standard software package. Typically, WinCC (or other SIMATIC products like WinCC flexible) with its OPC DA server interface is the data source and an external database is the data destination. Apart from this, you can also access the archived messages and process values in the WinCC database via the WinCC OLE-DB Provider. Depending on the volume of data, licenses are offered with 128 / 512 / 2,048 and 10K tags.

## Flexible switching between applications

IndustrialDataBridge makes a connection between the source and destination interface and transfers the data as follows

- depending on a **change in value**,

- after a configurable **time** has expired

- or if a specific **event** occurs.

Data is exchanged between automation systems made by different manufacturers via IndustrialDataBridge, for example via OPC. Connecting OPC servers via the Industrial-DataBridge makes possible communication between different devices, data sources and destinations.

- Linking SCADA and supervisory systems made by a wide variety of different manufacturers via the OPC interface.

- Storing process data in office formats like MS Excel or MS Access.

- SQL databases are available as the data destination for production data acquisition. The system can either transfer the data from the data source using OPC on an event-driven basis or transmit it directly to the controller.

- With a database as the data source, you can transfer recipes or specified values directly to WinCC or to a controller.

## Client Access Licenses (CAL)

You will find additional information for using WinCC/CAL in conjunction with the IndustrialDataBridge on page 33.
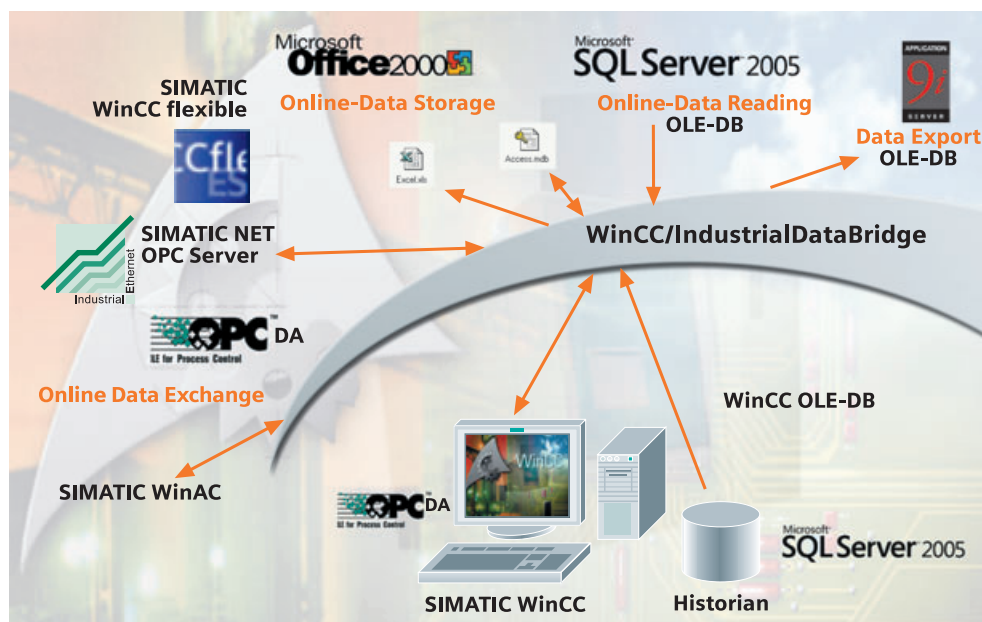


*WinCC/IndustrialDataBridge –Linking to databases and IT systems*

# SIMATIC WinCC/Connectivity Pack –
# Access to WinCC using OPC & WinCC OLE-DB

## Key benefits

- Simple IT and business integration by means of standard interfaces

- Access to online and historical data from any computers you like via standard interfaces (OPC XML DA, OPC HDA, OPC A&E, WinCC OLE-DB)

- Further processing or analysis of data using separate tools is possible

In WinCC, non-proprietary communication in the field of automation has always been very important. For this reason, WinCC has as standard an integrated **OPC DA 3.0 server** (Data Access) that gives you access to all the online values in the system and, on the other hand, can as a client read data from another application – across the Web too. The WinCC/ Connectivity Pack offers additional options.

This means that the system can transfer pre-processed process and production data to higher level systems for information conditioning (e.g. Manufacturing Execution Systems, Enterprise Resource Planning systems or office packages, e.g. Microsoft Excel, Microsoft Access, etc.)

### Access to messages and historical data via OPC / WinCC OLE-DB

The WinCC/Connectivity Pack includes the **OPC HDA 1.1** (Historical Data Access) and **OPC A&E 1.0** (Alarm & Events) servers for accessing historical data of the WinCC archive system or for transferring/acknowledging messages. As an **OPC XML DA 1.0 server**, WinCC can even send data on a cross-platform basis across the Web to PPS/MES systems; in the opposite direction, it can take OPC XML DA client order or recipe data.

As an HDA server WinCC makes available historical data from the WinCC archive system to other applications. The OPC client (e.g. a reporting tool) can specify the start and end times of a time interval and thus selectively request the data to be transferred. Apart from this, the client can request already conditioned data from the HDA server, i.e. actively trigger data compression before the data is transferred. The OPC HDA server can also be used in redundant configurations.

In OPC A&E, the system displays a WinCC message as an alarm and, together with all the ancillary process values, passes it on to any subscribers on the production or company management levels. Due to the filter mechanisms and subscriptions, the system only transfers selected, changed data. It is, of course, also possible to carry out acknowledgement at the MES or ERP level.

The **WinCC OLE-DB** Provider makes it possible to directly access the archive data that WinCC stored in the Microsoft SQL Server database (alarms, process values, user data). In this connection, you can even use statistic functions.

From a WinCC multi-client, a transparent process data access via the OLE DB is now also possible to redundant WinCC systems and distributed configurations with central archive server. For the addressing, only the symbolic computer name is needed.
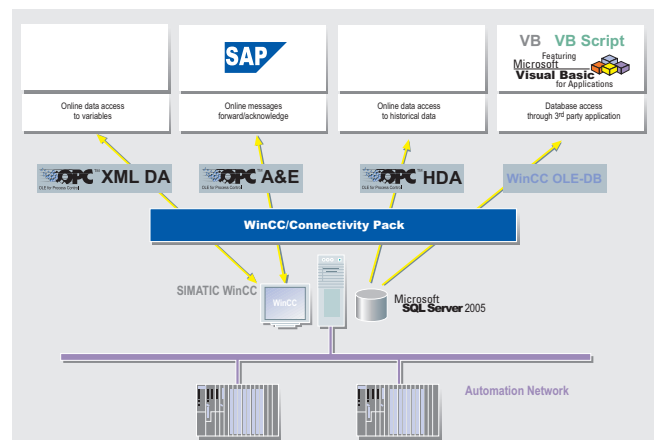
### WinCC/Connectivity Station

If process visualization is not needed at a station, you can use this WinCC option package to configure any Windows computer you like as a connectivity station with access to WinCC via OPC and WinCC OLE-DB without needing a WinCC installation to do so.

### Client Access Licenses (CAL)

To directly access current WinCC data via **OPC DA**, you do not need a separate license.

You always need **WinCC/CAL** whenever you want to access WinCC data across the interfaces of the options WinCC/Connectivity Pack and WinCC/IndustrialDataBridge from any computer which has not installed (and licensed) neither the basic WinCC system nor a WinCC option.

If desired, the **WinCC/CAL per Processor License** even provides access for all the computers in your configuration to the interfaces of the Connectivity Pack or allows them to use the IndustrialDataBridge.



*WinCC/Connectivity Pack –*
*Access to WinCC alarms and archives via OPC & WinCC OLE-DB*

# SIMATIC WinCC/Redundancy –
# Increasing system availability by redundancy

Increasing system availability due to redundancy in the case of applications with WinCC is possible by using

■ redundant servers,

■ redundant communications paths

■ and highly available controllers.

The WinCC/Redundancy option gives the user the opportunity to operate two linked WinCC single-user systems or server PCs in parallel, in order to monitor each other. For both redundancy partner servers you need one of the two redundancy licenses that are supplied with the option package. On the failure of one of the servers, the second server assumes control of the entire system. When the failed server resumes operation, the contents of all message and process value archives are copied back to the restored server. All in all, this results in **significantly higher levels of system availability**.

**Way of functioning**

In a **normal situation**, two WinCC stations or process data servers operate completely in parallel, i.e. each station has its own process connection and its own data archives.
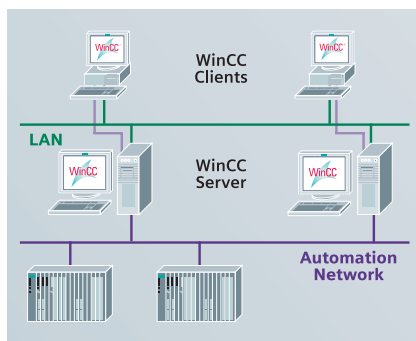


If either of the **WinCC stations fails**, the other one takes over archiving of messages, process and user data. This guarantees constant data integrity. In client-server operation, the system automatically switches clients from the failed server to the redundant machine. This guarantees continuous visualization and operation of the plant at each operator station.
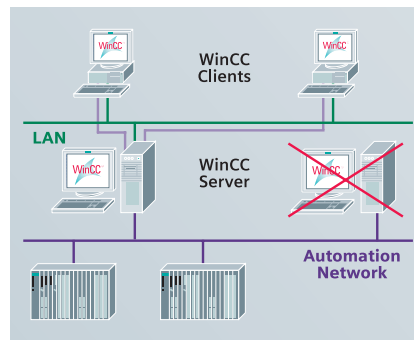


When the failed **server starts up again**, the system automatically matches in the background all the process values, messages (incl. statuses, acknowledgements, lists and comments) and data from the user archive for the down period (without influencing online operation) – this means that two stations are available again that have the same data.
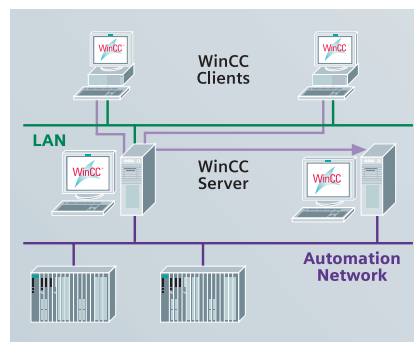


The system automatically does not just switch to the redundancy partner in the case of a failed server; it also does this in the case of **disturbed process communication** or **applications**.

**Additional increase in system availability**

In addition to using the WinCC/Redundancy option for running two servers in parallel, it is possible in a WinCC application to also implement **redundant communication channels** to the SIMATIC S7 controller. You do this by installing two communication modules and implementing duplicate communication paths (communication software S7-REDCONNECT needed). By using H-series SIMATIC S7 controllers, you can, if required, additionally increase **availability at the control level**.

By combining system solutions, you can create a **security concept** that meets even the most demanding requirements.

# SIMATIC WinCC/ProAgent –
# Higher availability due to process diagnostics

**Key benefits**

- Integral component of Totally Integrated Automation (TIA): increases productivity, minimizes the engineering outlay, reduces the lifecycle costs
- Provides support in locating and correcting faults, improves plant availability and reduces downtimes
- There is no additional configuration effort for the diagnostics functionality due to automatic generation of the diagnostics-relevant portions for control and HMI
- Reduces PLC memory and processor usage
- No special user know-how required for the operator

**Increases in productivity** are being achieved more often by saving costs. Maintenance is becoming of increasing importance. Of prime importance is the elimination of faults as fast as possible with as small a personnel overhead as possible. In the ideal case, the operating personnel should also handle part of the maintenance tasks. Operating personnel are on site, are acquainted with the sequences, and can intervene rapidly. This saves time and costs. This is where ProAgent supports the operating personnel with fast fault identification especially in the automobile industry and machine tool construction sector.

When a process fault occurs, SIMATIC ProAgent provides information on the location and cause of the fault and provides support with fault rectification. ProAgent provides a solution which is tailored to SIMATIC S7-300, S7-400 and WinAC. It can be used in combination with the S7-PDIAG and S7-GRAPH engineering tools for STEP 7. The ProAgent option package contains **standard views** that are updated during runtime with process-specific data.

**Standard views instead of configuration**

ProAgent is available for different equipment and software platforms from the SIMATIC HMI range: Operator Panels and Multi Panels, WinCC flexible and WinCC. ProAgent contains **standard views** that are geared to the requirements of process diagnostics on a plant or a machine. This is based on the interaction of STEP 7 option packages and ProAgent. During configuration, the data relevant to process diagnostics, such as symbols, comments, message texts, are stored in a standardized database organization. During runtime, the standard screens are filled with process-specific data.

SIMATIC WinCC accesses the engineering data directly and applies it in the WinCC project. The ProAgent standard screens needed for diagnostics operations are generated automatically in WinCC. ProAgent and the S7 Engineering Tools offer a **standardized diagnostics concept** for SIMATIC S7.

No further configuration is required for diagnostics functionality on the WinCC system.

The standard views include message view, unit overview diagram, diagnostic detail view, motion view, sequencer operating view.

**Function**

- Context-sensitive activation of the diagnostics based on a process error message
- Output of the operands with symbolic code and comment
- Changeover is possible between LAD, STL and the signal list
- Supportive troubleshooting by direct process access when using the motion view
- Output of the incorrect operand directly in the message, complete with address, symbol and comment
- Consistency check in RT: icons are used to identify inconsistent diagnostics units. Fast error localization is possible during the start-up phase with regard to the configured data.
- Direct, context-sensitive switching to the diagnostics view for each unit through the use of ProAgent functions
- Context-sensitive switching to STEP 7 (LAD/STL/CSF editor, S7-GRAPH, HW-CONFIG (on system fault messages)), fully automatic support
- S7-GRAPH OCX for graphic representation of sequencers (overview representation)
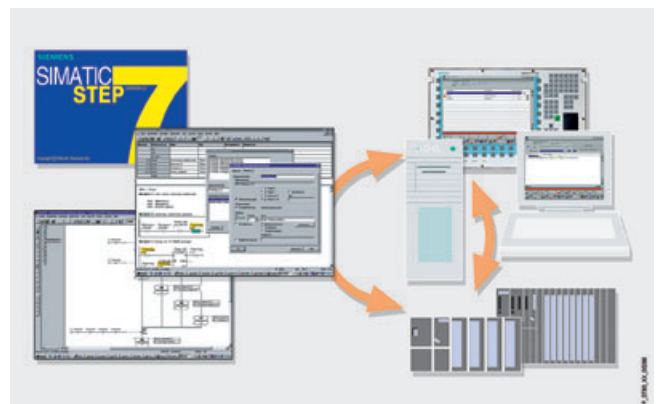


*Process diagnostics using WinCC/ProAgent and the STEP 7 Engineering Tools*

# SIMATIC Maintenance Station –
# User interface for an efficient maintenance

## Key benefits

- ■ Visualization of the maintenance information of the entire automation system
- ■ Automatic derivation of the data from the hardware configurations
- ■ Manufacturer-spanning display of service and maintenance data
- ■ Traceability of events and operator actions via automated alarms, which form the basis for later analyses to optimize the plant
- ■ Optimal resource planning via an overview of all upcoming maintenance jobs
- ■ Consistency and homogeneity of data, visualization and operation with the SCADA system and maintenance station

Consistently high productivity is the competitive requirement par excellence in every production. Production downtimes should be avoided if possible or – if that cannot be accomplished completely – be kept as minor as possible. Frequently, downtimes are also caused by less than optimal maintenance. Here, **intelligent maintenance strategies** can be employed, whose essential goal is to make the maintenance plannable, as a result of which downtimes are considerably reduced.

Efficient maintenance is possible in connection with the new WinCC option package SIMATIC Maintenance. Thereby it is irrelevant whether the process visualization and maintenance functionality run on a common computer or on separate devices.



*Monitoring of the plant status via automatically generated screens*

Since the same operating and monitoring tools are being employed, the display can be switched between SCADA and maintenance at any time. The advantage is obvious: The operator can – at any time – also obtain an overview of current identification & maintenance (I&M) information, without having to interrupt the process.

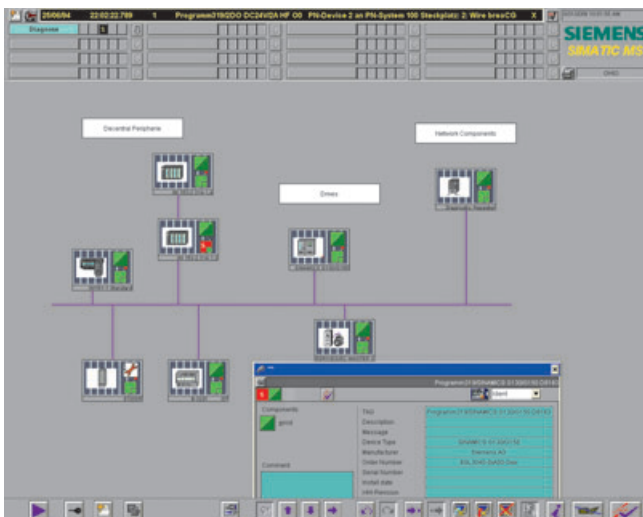### Generating instead of programming

The maintenance station is configured by selecting the automation systems to be displayed from STEP 7 to create a hardware configuration. With this hardware configuration, the maintenance station recognizes which devices belong to the plant and creates an image for the maintenance in WinCC. The integration of components is based on established standards and is possible for a large number of devices from different manufacturers.

The **project generates itself automatically** in the form of hierarchically structured, already connected WinCC screens – without additional programming work for the user – and then is automatically transferred to the maintenance station. New hardware components brought into the hardware configuration of STEP 7 are automatically made available to the maintenance station. A manual updating is not necessary, follow-up costs are avoided.

### Corrective/preventive maintenance

In runtime, the maintenance station displays all connected control components, switching units, drives, etc. and monitors the current plant status using uniform symbols. In doing so, the program not just responds to errors once they have occurred (i.e. **corrective maintenance**), but also to measures entered into the system that are to prevent errors prior to their occurrence **(preventive maintenance)**. Such time-dependent or load-dependent measures take place regularly and/or after a certain number of operating cycles, operating hours or load peaks, and can be scheduled in such a way as to **optimally utilize the existing resources**.

The SIMATIC Maintenance Station offers perfect support for performing the maintenance. In doing so, it generates a comprehensive database for the later optimization of the plant and ultimately results in reduced maintenance costs.

# SIMATIC WinCC/Audit –
# Tracking operator inputs and changes using Audit Trails

*Monitoring Runtime operation using WinCC/Audit (Runtime Auditing)*

WinCC/Audit is for monitoring changes in operator activities in runtime operation as well as for recording project changes at the engineering stage. The system records all the change data in a secure database known as the Audit Trail. You can view the Audit Trail using the Audit Viewer. This means that using WinCC/Audit provides continuous traceability of both operator activities and changes to projects and, at the same time, also helps machine tool builders and plant operators to reduce the amount of engineering time and effort involved in complying with the requirements of 21 CFR Part 11 and EU 178/2002. The engineering measures that are necessary for making validation easier are documented in a white paper.

**Monitoring runtime operation**

In runtime operation the system records the following in the audit trail:

■ Operating activities carried out

■ Activities within the scope of central user management using SIMATIC Logon

■ Starting and changing recipes

Apart from this, plant operators can individually record specific events by means of an audit entry function:

■ Operation of pushbuttons and sliders

■ Record Pressing of a key

**Audit Trail database and Audit Viewer**

The Audit Trail database stores all the change data that is subject to document control; this includes user actions, configuration changes and other changes. Components of Audit Trails include:

■ The date and time of the change

■ The project ID, PC and database name

■ The old value and the new one

■ The user name

■ The event/function

■ Comment/reason for change

The system visualizes the Audit Trail data by means of the Audit Viewer. Operators use filters to selectively set the desired view of the Audit Trail data and they can export this data to an Excel file. The Audit Trail data is stored securely on a tamper-proof basis and this means that you cannot change or delete it. This means that WinCC/Audit meets the FDA requirements of 21 CFR Part 11 in this respect too.

**Tracking project changes**

The tracking of project changes with WinCC/Audit is described in the chapter WinCC/ChangeControl (refer to p. 38).



*Access to the Audit Trail database using the Audit Viewer*

# SIMATIC WinCC/ChangeControl – Tracking project changes

# SIMATIC LOGON – Central, plantwide user management

Monitoring project changes is possible with WinCC/Audit and with the option package WinCC/ChangeControl as well. In this connection, WinCC differentiates between configuration changes that affect the WinCC database, e.g. changes in Tag Management or creating a user group and configuration changes that are limited to changes to files, what is known as document control. Document control involves process pictures, scripts and log layouts and customer-specific documents. This means that WinCC/Audit can monitor all these documents or files for changes, create intermediate versions or retrieve them using a rollback function. The entire monitoring process can be activated very easily and conveniently. This means that in the case of plant standstills, for example, plant engineers and operators can quickly and easily comprehend the changes that have been made to the plant. This supports trouble-shooting and reduces plant downtimes.

Using a project versioning tool

- WinCC projects can be archived, restored and deleted
- WinCC data including the project database, project files (e.g. screens, reports, scripts) and user documents can be archived
- Activities of the project versioning tool can be recorded

In this way all changes made to a plant beginning from the production start and continuing throughout the entire life cycle can be recorded and – using **defined versions** – be documented.

## Key benefits

- Central, cross-plant user management, integrated in Windows User Management
- High levels of security due to measures on both the administrator and user sides
- Can be used in different configurations (single-user, client/server systems up to highly available solutions)
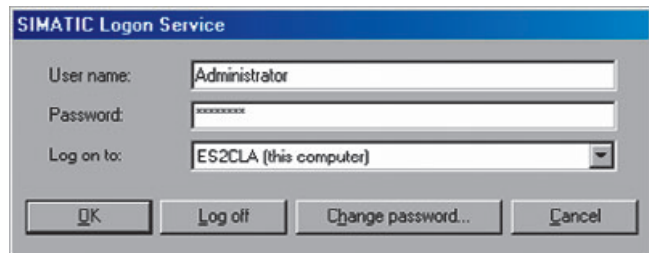
**Central user management**

The use of IT technology in process automation together with the number of users with different authorizations that result from this places high demands on user administration to guarantee security in the entire plant.

User management with SIMATIC Logon integrates itself in the safety system and user management of Windows and in this way meets the FDA requirements.

SIMATIC Logon offers a **number of security mechanisms** on both the administrator and user sides. Users are uniquely identified in the usual way by means of a user ID, a user name and a password. Functions like password aging, automatic log-off after a predefined time and blocking the password after entering it wrongly several times guarantee the highest levels of operating security. In addition administrators can set up new users online on **a cross-plant and cross-application basis** as well as lock these users.

In the SIMATIC WinCC environment, you can use Logon on a wide variety of different structures such as single-user stations or client/server configurations. With SIMATIC Logon, the **high availability** is provided by primary/secondary domain controllers and the local Windows User Management system.



*Archiving and restoring projects or configuration data*



*User management in the food industry*

# SIMATIC WinCC/User Archives – Managing data records

The WinCC/User Archives option allows the application of **user archives**, in which related data is stored in **data records**. WinCC and its automation partners (e.g. a SIMATIC S7 PLC) can write to these data records and exchange them among one another if required.

An operator can, for example, input parameter records in WinCC, store them in the user archive and forward them to the automation level if required. In the other direction, a PLC can continuously acquire production parameters during a shift and transmit them to WinCC at the end of the shift. Other applications include the acquisition of batch data, the specification of production parameters and the control of inventory data.

## Easy to configure ...

WinCC user archives are conveniently created and preset with data using a separate editor. Special **ActiveX controls** from the Graphics Designer's object palette are used to display data from user archives at runtime.

You make the link between data records and fields from user archives to the process simply using a **direct tag link**.

## ... versatile application

**Import and export functions** support the reading in/out of data via external applications (e.g. MS Excel). Freely selectable filter criteria enable clear display of data records. The

**Key benefits**

- Storage and management of any user data in data records
- Flexible representation by means of ActiveX controls optionally with a table and form view
- Simple linking of data record fields to the process via direct tag linking
- Import/export functions for further-processing using other tools (e.g. Microsoft Excel)

view can be switched between **a spreadsheet** and a **form view**.

WinCC provides functions for the **free organization of data storage** in the user archives which influence archives, data records and fields. They can create, open, close or reset archives and for example read, write or overwrite data records or field contents.

**Sequential archives** can for example record batch data, shift production data or data on product quality and fulfill the statutory documentation requirements by recording on a continuous basis.

Only servers and single-user stations need individual licenses.

*WinCC/User Archives editor: Free definition of archives, views and archive data*



*Display of the archive data in table form or as an individual record based on the User Archive Control used*

# SIMATIC WinCC/IndustrialX –
# Configuring user-defined ActiveX objects

## Key benefits

- Easy creation using configuration wizards

- Fast-track starting due to the use of standards: ActiveX technology, creation using Visual Basic

- Central creation and modification of object representations of the same type (type-coding) saves you time and money

- Configuration of intelligent, vertical market and technology-specific objects (graphic representation and logical processing) with expertise protection

- Can be used on a diverse basis: in WinCC pictures and other Windows applications (e.g. Internet Explorer, Excel)

Using only the basic functions, you can configure SIMATIC WinCC in a user-friendly way. WinCC/IndustrialX is an option that further simplifies the solving of a visualization task by **standardization of user-specific objects**.

No separate display object is required any more for each motor, pump, valve, etc., instead objects of the same type are standardized. Engineering become more cost-efficient, if functions and displays can be used repeatedly.

IndustrialX employs the **ActiveX technology** for the process visualization. Configuration wizards make the creation of your own standard displays easy. IndustrialX controls are flexible and can be tailored to meet the re-quirements of the most varied applications, for example specific for applications in the chemical, glass or paper manufacturing industries.

IndustrialX offers code templates for easy linking customer-specific ActiveX controls to WinCC data sources that are themselves suitable for use on Web Navigator clients.

## Quick and easy to configure

Using the IndustrialX Control Designer, you create one IndustrialX control for process objects of the same type, e.g. for several motors. Linking is carried out of the individual data of a data record e.g. the target value, actual value, temperature and operating mode. Once you have created the IndustrialX control, you can integrate it into pictures as often as you like.
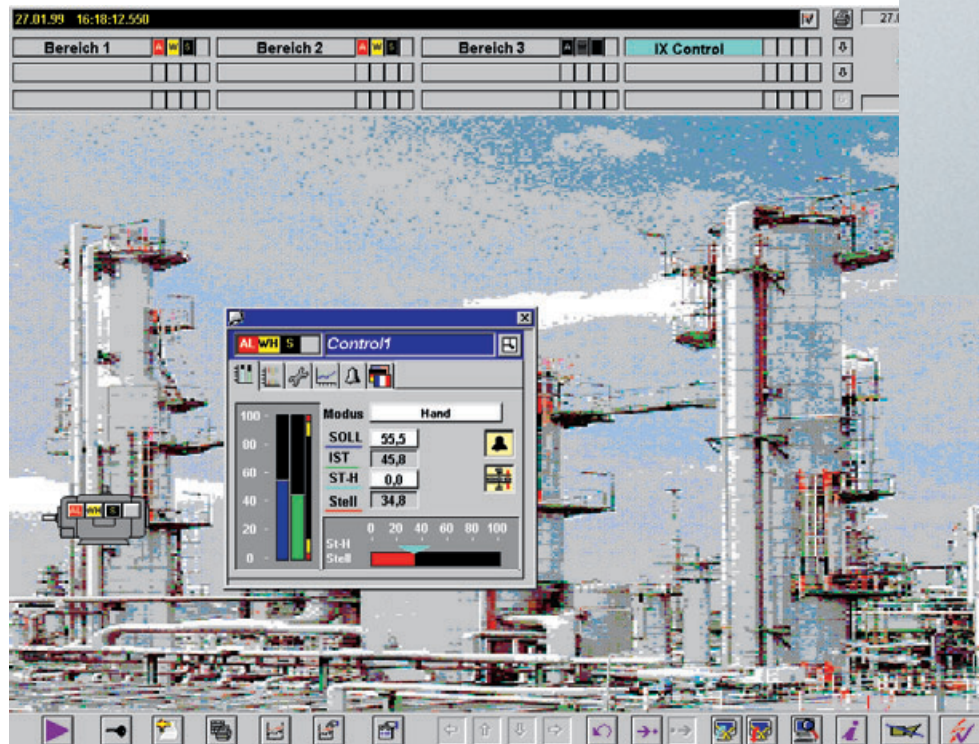


*Creation of ActiveX controls in Visual Basic using configuration wizards*

# SIMATIC WinCC/ODK –
# Open Development Kit

At integration, you only need to specify the name of the data record. At runtime, each integration of the IndustrialX Control then automatically works with the data of the assigned data record. Each time the IndustrialX Control is used, you do not need to spend time and effort on linking the individual data.

## Carry out modifications on a central basis
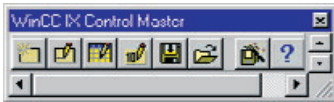


If you have a lot of IndustrialX Controls, which are already integrated in process pictures, you can easily change them later. Such changes are made once at a central location and can affect the graphic representation as well as the processing logic. All the changes affect all the IndustrialX controls in all the process pictures that have already been configured. If, for example, there are 47 motors of the same type in a plant that are visualized in 13 different process pictures using IndustrialX controls, you only need to make the changes once at a central location. These changes are then effective everywhere. This obviates the need to carry out time-consuming, errorprone changes at 47 different locations!

## Rapid processing, know-how protected

IndustrialX controls are composed of compiled Visual Basic code that guarantees fast, effective processing. The technological know-how that you invested in creating your controls can – if necessary – be protected from copying if the source code is not supplied.

Wouldn't you like to significantly expand the functionality of your WinCC system for an industry-specific application? Do you want to integrate your own data in WinCC tools, e.g. the reporting and logging system? The **Open Development Kit (ODK)** option package describes the open programming interfaces, with which data and functions of the WinCC configuration and the WinCC runtime system can be accessed. The interfaces are designed as C-Application Programming Interfaces **(C-APIs)**.

**API functions** can be used as follows:

■ Within WinCC, for example, in Global Scripts or within C actions in Graphics Designer,

■ In Windows applications in C development environments (the current version of Microsoft Visual C++ is required as the development environment for WinCC).

API functions are **configuration and runtime functions**, e.g.:

■ MSRTCreateMsg: Generates a message

■ DMGetValue: Determines the value of a tag

■ PDLRTSetProp: Sets the object properties in a picture

The scope of delivery of WinCC/ODK comprises a CD-ROM with lots of examples and a voucher for a one-day introductory seminar.

# Abbreviations

| | |
|---|---|
| **API** | **A**pplication **P**rogramming **I**nterface |
| **CAL** | **C**lient **A**ccess **L**icense |
| **CAS** | **C**entral **A**rchive **S**erver |
| **CFR** | **C**ode of **F**ederal **R**egulations |
| **ERP** | **E**nterprise **R**esource **P**lanning |
| **FDA** | **F**ood and **D**rug **A**dministration |
| **HMI** | **H**uman **M**achine **I**nterface |
| **KPI** | **K**ey **P**erformance **I**ndicators |
| **MES** | **M**anufacturing **E**xecution **S**ystem |
| **ODK** | **O**pen **D**evelopment **K**it |
| **OLE** | **O**bject **L**inking and **E**mbedding |
| **OLE-DB** | **OLE D**ata**b**ase |
| **OPC** | **O**penness, **P**roductivity and **C**ollaboration |
| **OPC A&E** | **OPC A**larm and **E**vents |
| **OPC DA** | **OPC D**ata **A**ccess |
| **OPC HDA** | **OPC H**istorical **D**ata **A**ccess |
| **OPC DA XML** | **OPC D**ata **A**ccess (with) e**X**tended **M**arkup **L**anguage |
| **PPS** | **P**roduction **P**lanning **S**ystem |
| **SCADA** | **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition |
| **SQL** | **S**tructured **Q**uery **L**anguage |
| **TIA** | **T**otally **I**ntegrated **A**utomation |
| **VBA** | **V**isual **B**asic for **A**pplications |
| **VBS** | **V**isual **B**asic **S**cript |
| **XML** | e**X**tended **M**arkup **L**anguage |
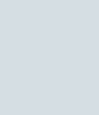
# More information
# in the Internet

SIMATIC WinCC Homepage
**www.siemens.com/simatic-wincc**

SIMATIC WinCC Options
**www.siemens.com/simatic-wincc-options**

SIMATIC WinCC Add-ons
**www.siemens.com/simatic-wincc-addons**

SIMATIC WinCC success stories
**www.siemens.com/hmi-success-stories**

Information on Plant Intelligence
**www.siemens.com/plant-intelligence**

WinCC Competence Center
**www.siemens.com/competencecenter**

WinCC Specialisits (former: Professionals)
**www.siemens.com/wincc-specialists**

SIMATIC Service & Support
**www.siemens.com/automation/service&support**

SIMATIC Contact Partners
**www.siemens.com/automation/partner**

Further information material
**www.siemens.com/simatic/printmaterial**

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