



SIEMENS

SIMATIC HMI

**WinCC flexible
Getting Started Options**



Order number 6ZB5370-1CN02-0BA2

Edition 04/2006

A5E00279943-03



Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety as well as to avoid property damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol.



Danger

indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Warning

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Caution

used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Caution

used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Notice

used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state.

Wenn several danger levels apply, the notices of the highest level (lower number) are always displayed. If a notice refers to personal damages with the safety alert symbol, then another notice may be added warning of property damage.

Qualified Personnel

The device/system may only be set up and operated in conjunction with this documentation. Only qualified personnel should be allowed to install and work on the equipment. Qualified persons are defined as persons who are authorized to commission, to earth, and to tag circuits, equipment and systems in accordance with established safety practices and standards.

Intended Use

Please note the following:



Warning

This device and its components may only be used for the applications described in the catalog or technical description, and only in connection with devices or components from other manufacturers approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up and installed correctly, and operated and maintained as recommended.

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in the manual are reviewed regularly, and any necessary corrections will be included in subsequent editions. Suggestions for improvement are welcomed.

Siemens AG 2006
Technical data subject to change

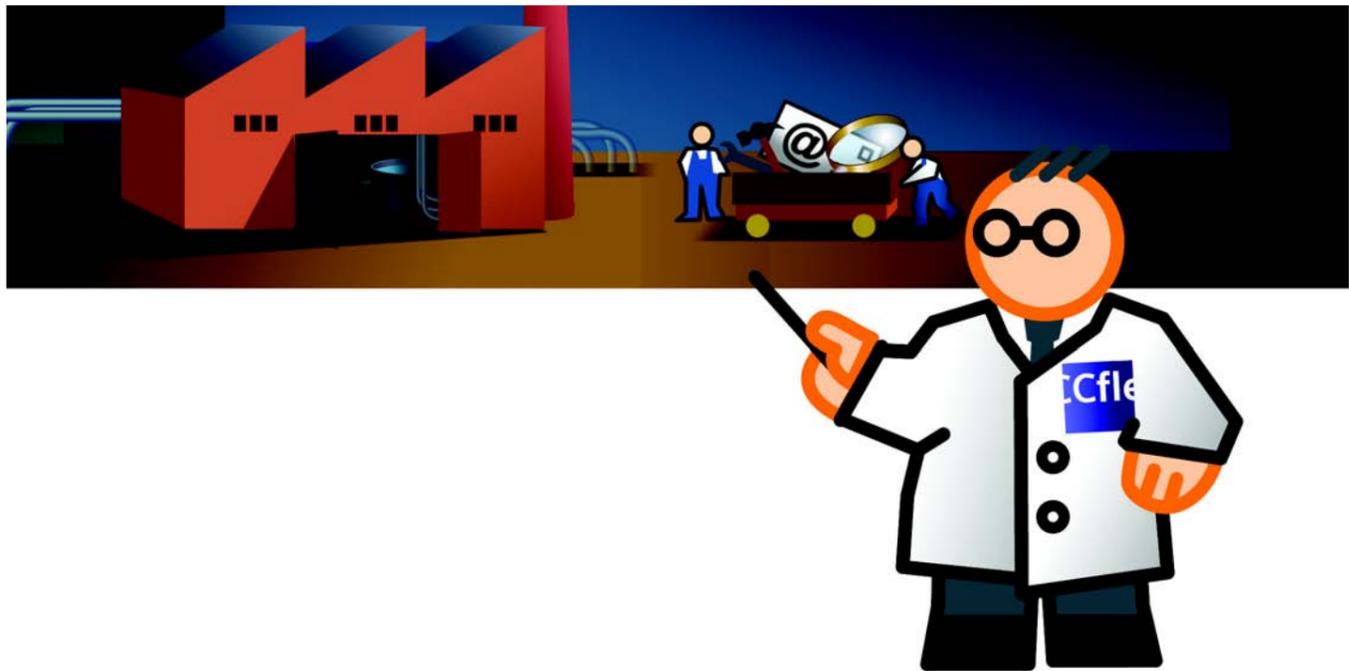
Siemens Aktiengesellschaft

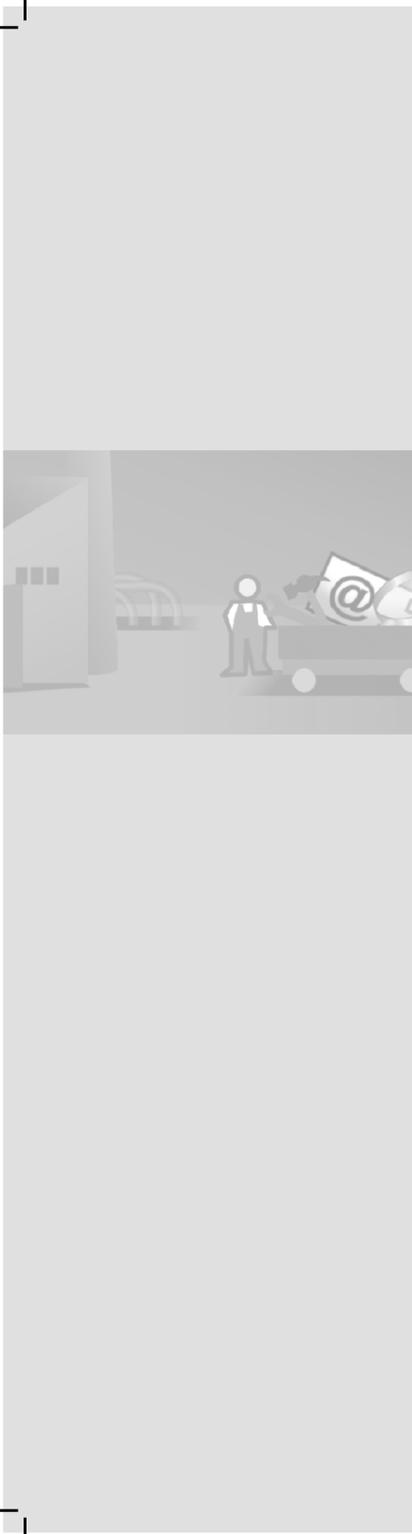


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1 Welcome



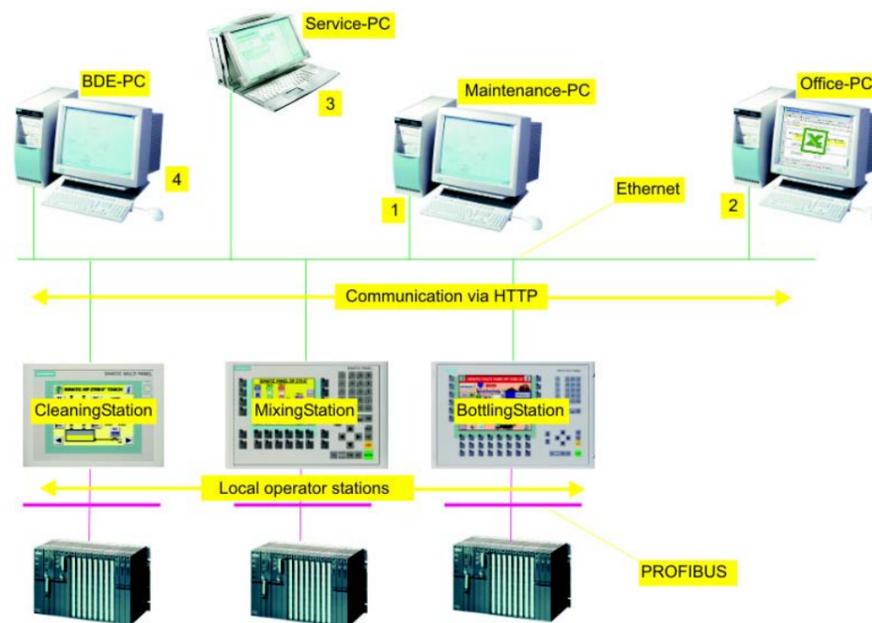


Welcome to WinCC flexible “Getting Started Options”. We shall show you what additional configuration options are included in the WinCC flexible optional packages.

With the fruit juice mixing plant project in Getting Started Advanced, you became familiar with only one unit of the filling station. The filling station consists of the following units:

- Cleaning station (CleaningStation)
- Fruit juice mixing station (MixingStation)
- Bottling station (BottlingStation)

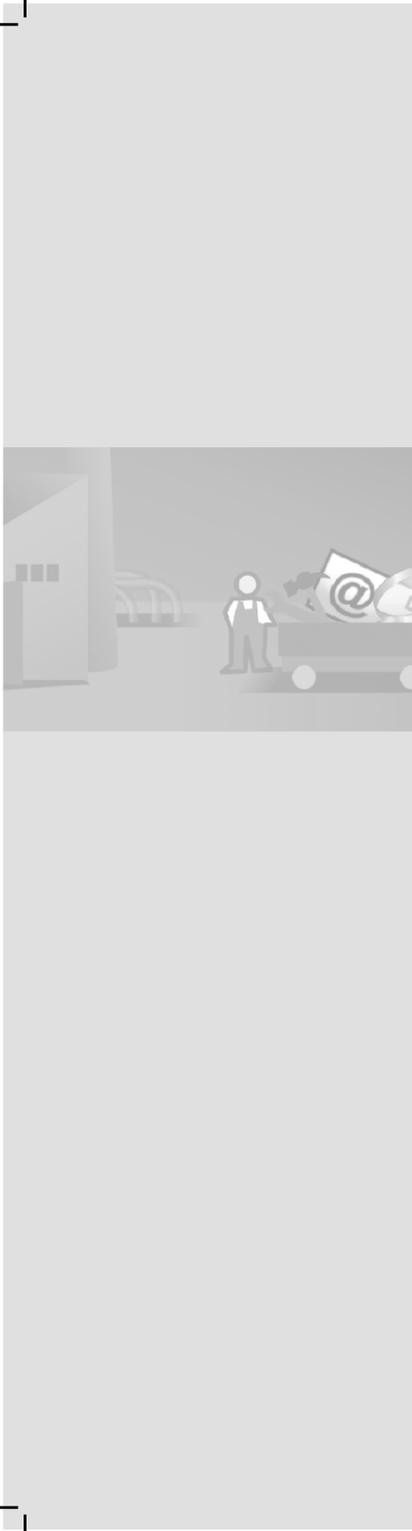
1 Welcome



All stations are monitored and operated by the shift manager directly from his place of work (1). Important user actions, such as editing recipes, must be confirmed by electronic signature and are logged to a separate log file. The sales manager uses MS Excel to view selected production data (2). The field service technician in charge is informed immediately of any faults, and takes immediate service actions via the Internet (3). Production data acquisition ensures that all essential process data are recorded and analyzed (4).

This Getting Started Options shows you how to use the following options to implement the scenario described earlier:

- Using Audit
- Using Sm@rtAccess
- Using Sm@rtService
- Production data acquisition with OPC



Requirements

If you would like to perform the shown configuration steps yourself, you need a PC that is connected to the OP 270 6" and MP 270B 10" HMI devices via Ethernet. The Ethernet interface on the OP 270 6" is updated with an NE2000-compatible CF card.

You use the PC as master control station, as office PC, service PC, and as BDE PC.

The self-extracting archive `Project_GettingStarted_Options_WinCC_flexible_2005.exe` in the "Documents\[language]\Getting Started" folder on your WinCC flexible CD3 contains the project, and is extracted to the default path: "C:\Temp". The project file with "Complete" suffix contains the entire configuration. The project already contains the MasterControlStation, the OP 270 project from the Getting Started Advanced (MixingStation), and the BottlingStation.

The following IP addresses are used in this Getting Started as an example:

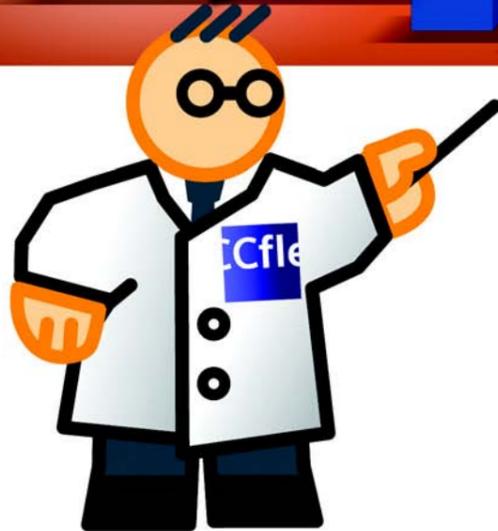
- MasterControlStation (master control PC): 192.168.0.1
- CleaningStation: Ignored in this Getting Started.
- MixingStation (OP 270 6"): 192.168.0.22
- BottlingStation (MP 270B 10" Key): 192.168.0.23

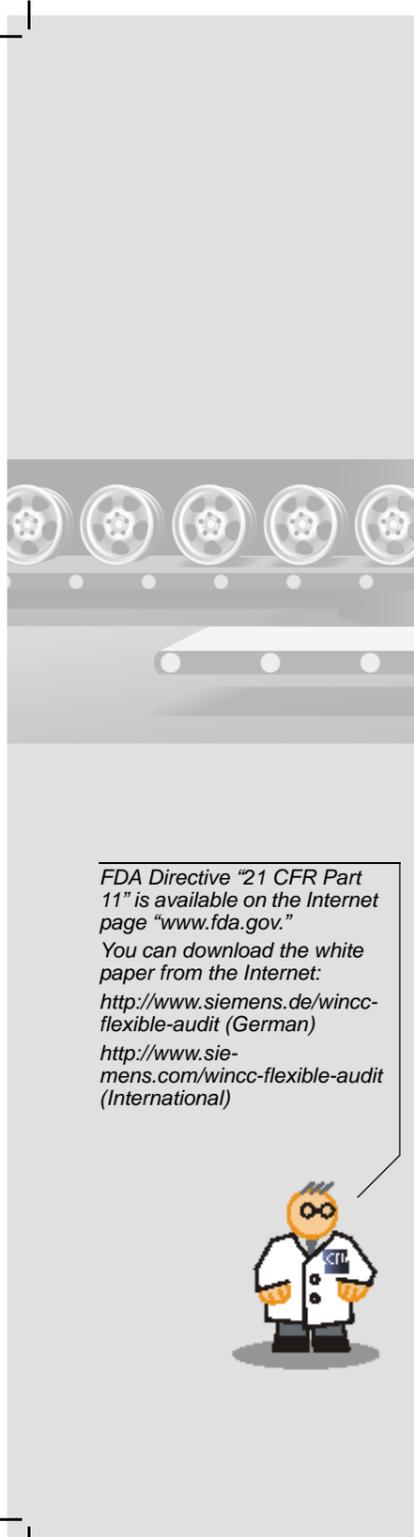
Subnet mask: 255.255.255.0.

You may also use HMI devices from the 177, 270-, 277 and 370 classes. However, we advise you to use OP 270 6", because this allows you to reuse the project from the Getting Started Advanced.

The TP 177B PN/DP, OP 177B PN/DP and Mobile Panel 177 PN/DP HMI devices can only be used with the Sm@rtAccess and Sm@rtService options.

2 Using Audit





FDA Directive "21 CFR Part 11" is available on the Internet page "www.fda.gov."
You can download the white paper from the Internet:
<http://www.siemens.de/wincc-flexible-audit> (German)
<http://www.siemens.com/wincc-flexible-audit> (International)



2.1 What is Audit?

User actions logging in the context of Tracking & Tracing is rapidly gaining importance in the pharmaceuticals sector, in Food and Beverages industry and in other industrial sectors. Electronic logging of any relevant operator actions, mandatory confirmation by electronic signature and commenting of actions represent appropriate measures to keep a full track on the production process. Those features also allow tracking and tracing of errors, and the identification of operators and operated components. On the same hand, however, it is of vital interest that production data are forgery-proof and readable at all times.

User administration is a basic functionality in WinCC flexible, and offers an effective security system with password protection. This also allows explicit assignment of restrictive user rights to specific tasks, such as editing recipes.

The electronic documentation of production data was thus defined in standards for specific business sectors, and globally for all business sectors. The most important of those regulations is the legislative text in 21 CFR Part 11 on "Electronic Data Recording and Electronic Signatures", issued by the US Food and Drug Administration FDA. In addition, various EC Directives apply to specific business sectors.

Based on the FDA Directive "21 CFR Part 11", authorities have issued requirements which all production plants must satisfy for the "Good Manufacturing Practice" (GMP).

The basic functionality of WinCC flexible already covers a certain scope of those requirements. The "Audit" option satisfies requirements of logging operator actions on the HMI device, and the "ChangeControl" option ensures adequate logging and tracking of any changes in the configuration.

2 Using Audit

This Getting Started is focused on the "Audit" option. In order to satisfy requirements in accordance with the FDA Directive, the documentation of the production process of our fruit juice mixing plant must be rendered more precisely. The electronic signature and mandatory comment field features make sure the operator identifies himself, and properly substantiates his actions by comments (editing of recipes, for example.)

The owner of the fruit juice mixing plant can thus trace and analyze the entire production process.

User administration is a component of basic WinCC flexible functionality.



2.2 Planning a regulated project

To set up our “GettingStarted_Options” sample project as a regulated project, we first need to give project planning some preliminary attention:

- Requirements of user administration
- Decision on which operator actions, such as changing values, or actions in the context of recipe management, should be confirmed by signature, commented and logged to a file.
- Special logging features

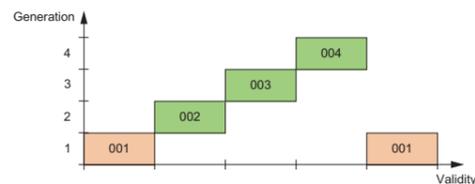
Extended requirements for the user administration

Prerequisite for tracking operator actions at the fruit juice mixing plant is the unique identification of all operators of a production shift. For this reason, you configured a user administration in “Getting Started Advanced,” consisting of the assignment of users, passwords and user groups, which are assigned specific access rights.

Additional requirements of user administration stipulated in FDA Directives:

- The password validity expires after a configurable period, and should then be changed by the user. The operator receives a message informing him of the expiry date/time of the password.
- Existing passwords may not be reused unless a configurable number of password generations have been completed.

Example: A “3 generations” setting does not allow reuse of the password “001” unless the password has been changed three times:



- The operator will be logged off automatically if no actions are carried out within a configurable period (inactivity time-out.)
- An operator is automatically assigned to the “unauthorized” group after having entered the wrong password three times.

2 Using Audit



Use the "Record user action" system function to record the operation of control elements, such as buttons, and scripting actions.



10

Important operator actions

In order to provide adequate and mandatory proof of events, you define which operator actions you should record and comment, or confirm by electronic signature. Appropriate evidence must be provided for all operator interventions in the active production process, such as toggling from "auto" and "manual" plant operating mode, or changing the mixing ratio of a recipe. Responsibilities for operator actions are clearly defined by the electronic signature.

Operator actions which form part of the daily production process (screen change, for example), and do not significantly contribute towards tracking operator activities, may be logged, but should not impair the overview of important operator actions.

Based on the operator actions which require proof, you can determine which objects you need to adapt in your project:

- GMP-relevant tags
 - Change of values by users
- GMP-relevant recipes
 - Creating, changing and saving recipe data records
 - Transfer of recipe data records to the PLC and from the PLC
 - For recipe tags: Changing the setting for the synchronization of tag values with PLC data (offline/online)

Audit Trail automatically logs user actions with respect to messages (acknowledgement and attempts to acknowledge), user administration (user logon and logoff, and import of user administration data) log files (running and closing a log file.)

"Audit Trail" log type

All operator actions requiring proof are logged centrally. The new "Audit Trail" log type is available for such actions. In contrast to the alarm log, the Audit Trail represents an infinite log file.

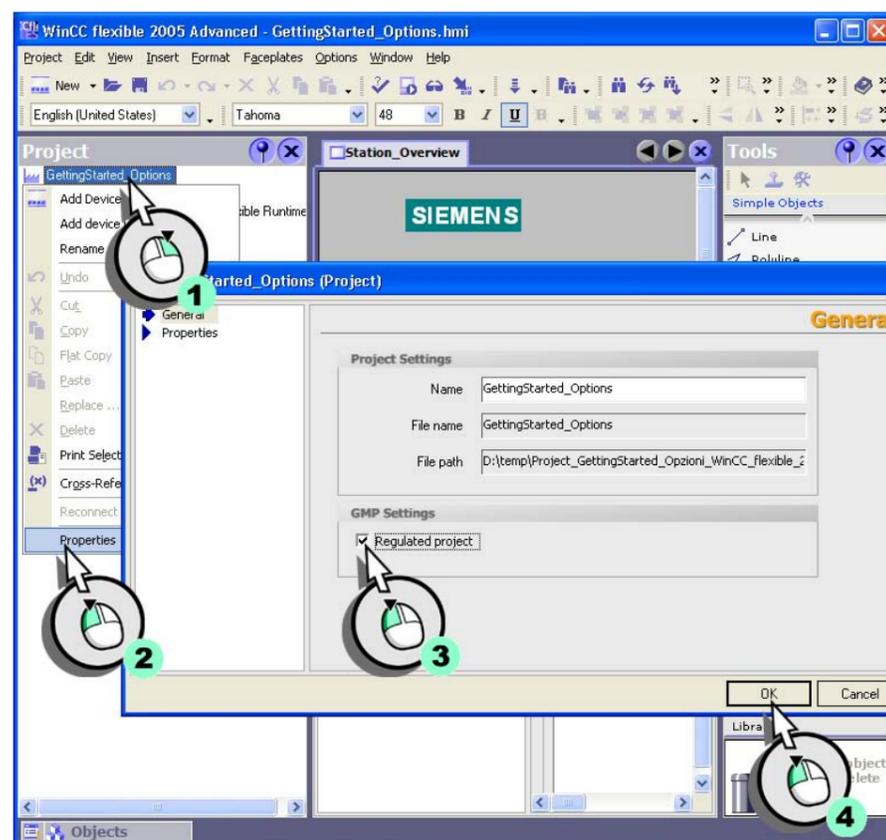
Alarms and acknowledgements are saved to a separate alarm log as usual. In addition to the reference to the action and message number, the name of the operator who acknowledged the message will be logged in the Audit Trail.



2.3 Creating a regulated project

All modifications of recipes or of the mixer speed are recorded in an Audit Trail file according to FDA directives, in order to ensure tracking of the entire production process of the fruit juice mixing plant.

1. Create the project as "Regulated project":



2 Using Audit

2. Configure the “Orange” recipe so that the operator has to confirm the transfer and saving of all its recipe data records by means of electronic signature:

The screenshot displays the WinCC flexible software interface. On the left, the 'Project' tree shows the 'Orange' recipe selected. The main window is divided into two panes. The top pane, titled 'Station_Overview', shows the recipe details for 'Orange' with a table of elements:

Name	Display name	Tag	Text list	Defa
Liter Wasser	Litre Water	Litre_Water	<undefined>	0
Liter Konzentrat	Litre Concentrate	Litre_Concentrate	<undefined>	0
Kilo Zucker	Kilo Sugar	Kilo_Sugar	<undefined>	0
Gramm Aroma	Gram Aroma	Gram_Aroma	<undefined>	0

The bottom pane, titled 'Orange (Recipe)', shows the 'Settings' tab with three checked options:

- Log user actions in Audit Trail
- Sign transfer of recipe data records
- Sign saving of recipe data records

3. Configure the “Mixer_Speed” and “Operation_Mode” tags so that any operator intervention in the production process, such as toggling the plant operating mode, or setting the default mixer speed, must be confirmed by digital signature and substantiated by comment:

The screenshot displays the WinCC flexible configuration environment. The 'Project' tree on the left shows the 'Tags' folder selected. The 'TAGS' table lists various tags, with 'Mixer_Speed' and 'Operation_Mode' highlighted. The 'Objects' list on the bottom left shows the 'Mixer_Speed' tag selected. The 'Mixer_Speed (Tag)' properties window on the bottom right shows the 'GMP Settings' dialog, where 'Mandatory commenting' is checked and the 'Confirmation type' is set to 'Electronic signature'.

Name	Connection	Data type	Address
FillLevel_Water	Connection_1	Int	DB 1 DBW 2
Gram_Aroma	Connection_1	Int	DB 1 DBW 18
Kilo_Sugar	Connection_1	Int	DB 1 DBW 16
Litre_Concentrate	Connection_1	Int	DB 1 DBW 14
Litre_Water	Connection_1	Int	DB 1 DBW 12
Mixer_SetSpeed	Connection_1	Int	DB 1 DBW 22
Mixer_Speed	Connection_1	Int	DB 1 DBW 10
Operating_M...	Connection_1	Int	DB 1 DBW 24
Valve_Status	Connection_1	Int	DB 1 DBW 0

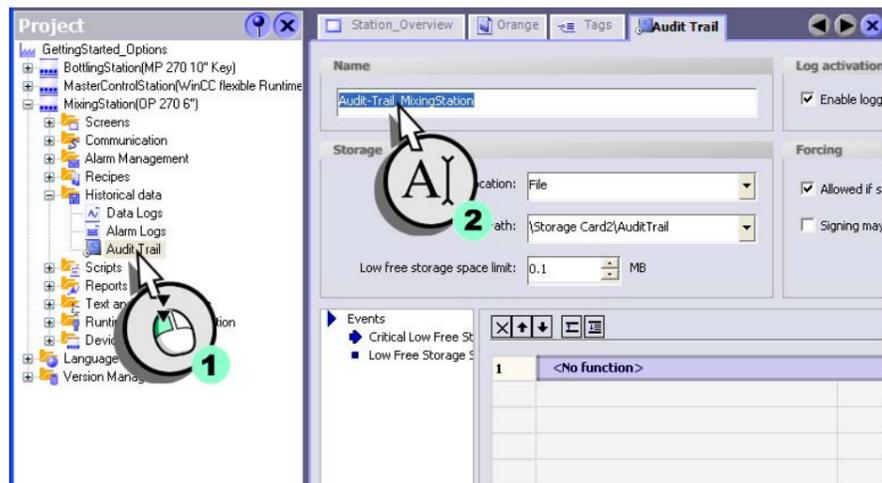
Icon	Name	Info
	Current_Dataset	DB 1 DBW 20
	Current_Langu...	<No address>
	FillLevel_Aroma	DB 1 DBW 8
	FillLevel_Conce...	DB 1 DBW 4
	FillLevel_Sugar	DB 1 DBW 6
	FillLevel_Water	DB 1 DBW 2
	Gram_Aroma	DB 1 DBW 18
	Kilo_Sugar	DB 1 DBW 16
	Litre_Concentr...	DB 1 DBW 14
	Litre_Water	DB 1 DBW 12

GMP Settings

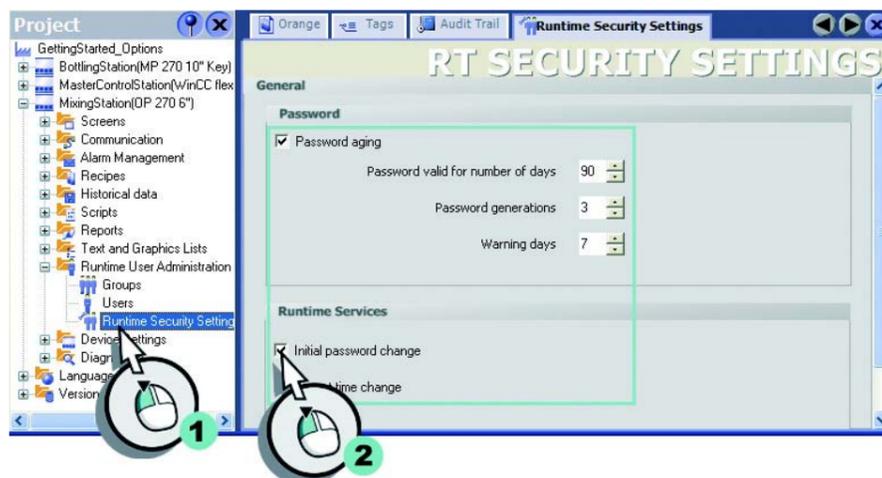
- GMP relevant
- Mandatory commenting
- Confirmation type:

2 Using Audit

4. Enter a file name for the Audit Trail:



5. Finally, configure the security settings for the user password validity:



Users initially logging on to the HMI are requested to change the default password.

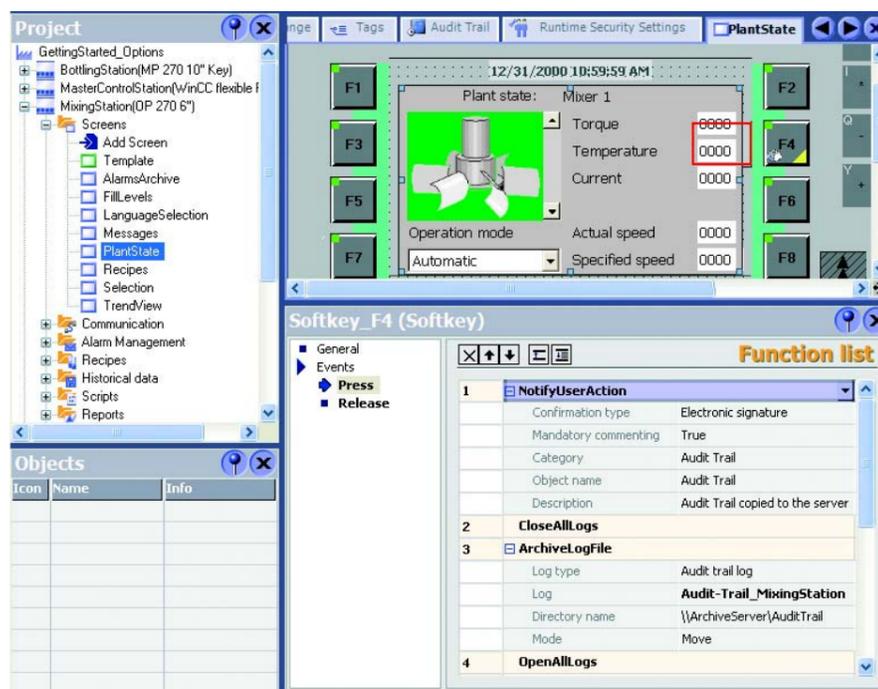
6. Finally, configure a function key in the “PlantState” screen which the operator may use to move the Audit Trail to the configuration computer. This operation should be logged in the Audit Trail and confirmed by electronic signature.

- Configure the system function that saves the operation to the Audit Trail file, and requests the operator's confirmation by electronic signature:

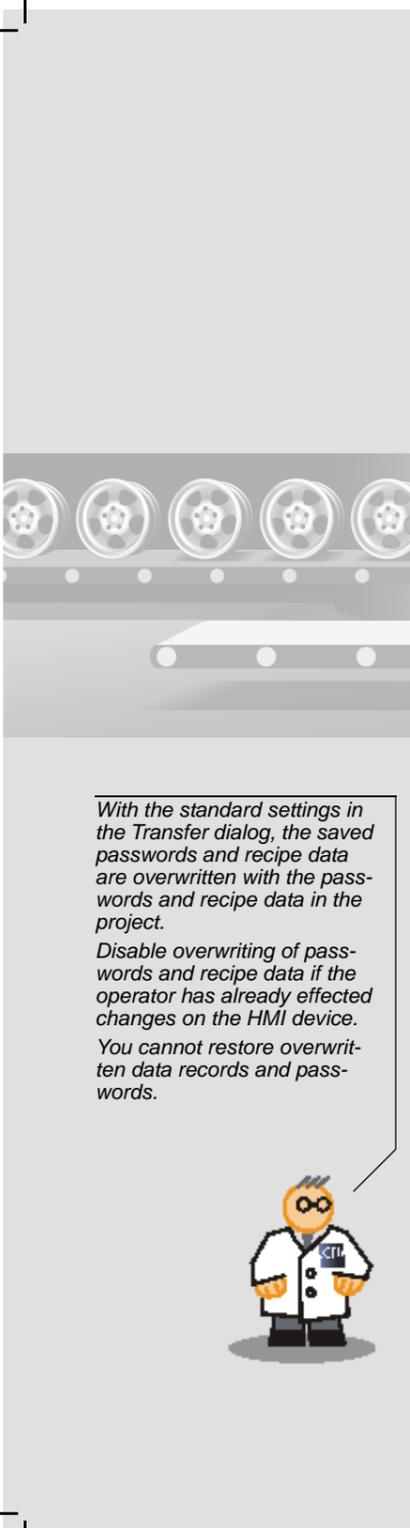


2 Using Audit

- Configure the system functions used to move the Audit Trail to the configuration computer:



Closing all archives is necessary, so that the Runtime does not access the Audit Trail. The Audit Trail is renamed on the HMI device with a time stamp with the following name: Name_Date_Time_HMIdeviceName, e.g., "Audit-Trail_MixingStation_20050524_122358_MixingStation". When renaming, a new, empty Audit Trail is created so that logging can be proceeded continuously.



With the standard settings in the Transfer dialog, the saved passwords and recipe data are overwritten with the passwords and recipe data in the project.

Disable overwriting of passwords and recipe data if the operator has already effected changes on the HMI device.

You cannot restore overwritten data records and passwords.



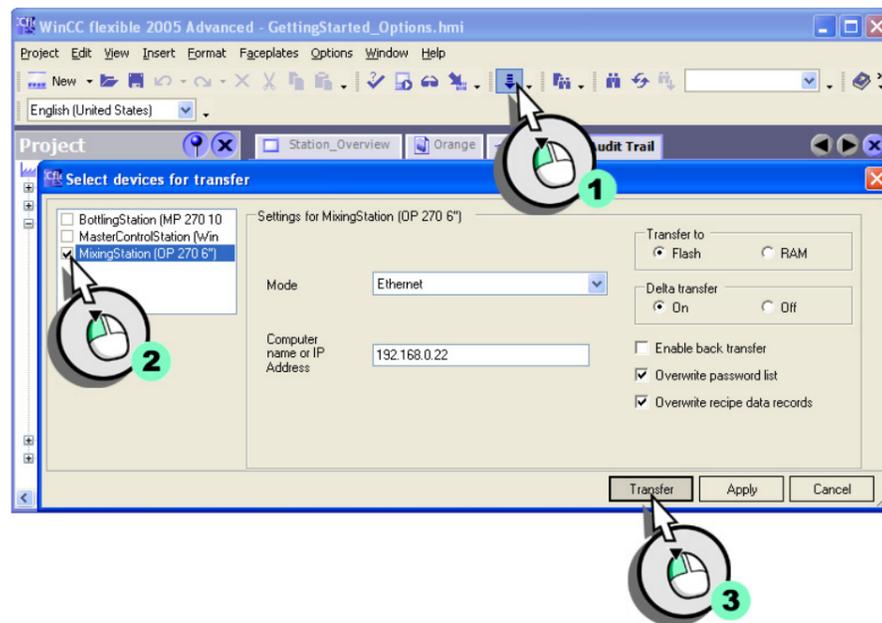
2.4 Operating a regulated project in Runtime

As of now, the operator of the fruit juice mixing plant must confirm any modification of recipe data and of the mixer speed with his electronic signature and comment.

We will now download the project data to the HMI in order to apply the changes.

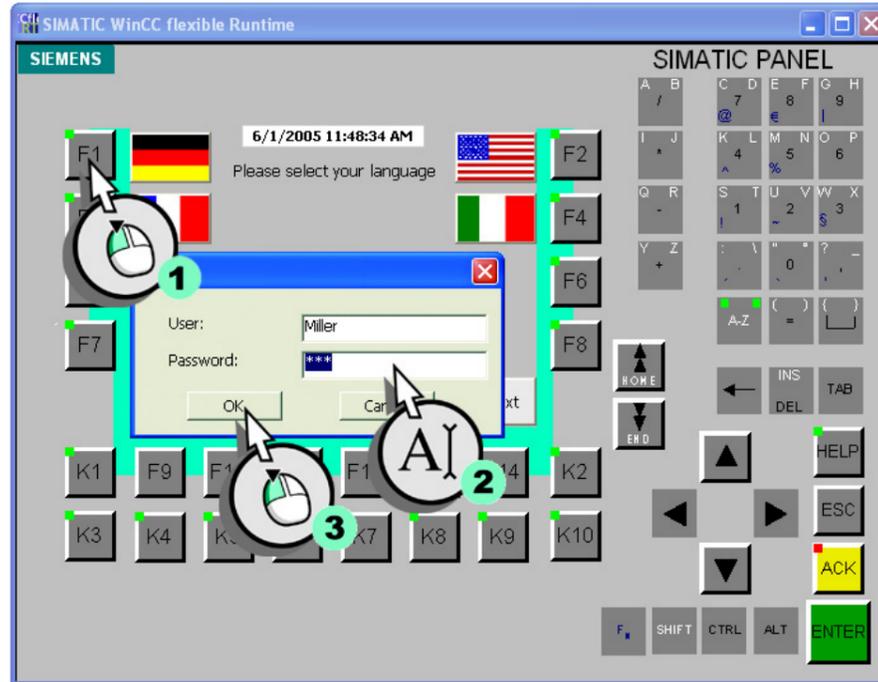
Creating a new recipe data record

1. Download the project to the "Mixing Station" HMI device:

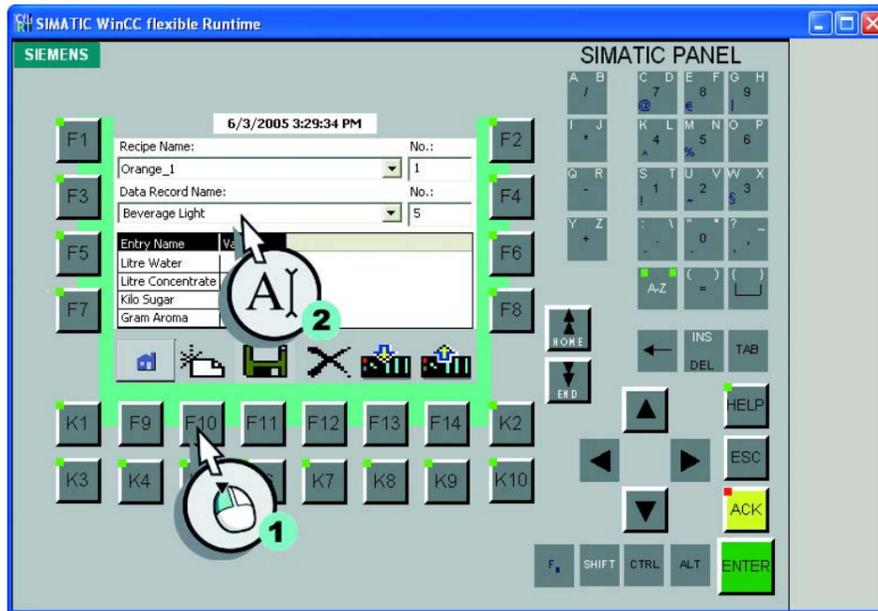


2 Using Audit

2. Log on to the HMI device under the name "Miller" and password "002":

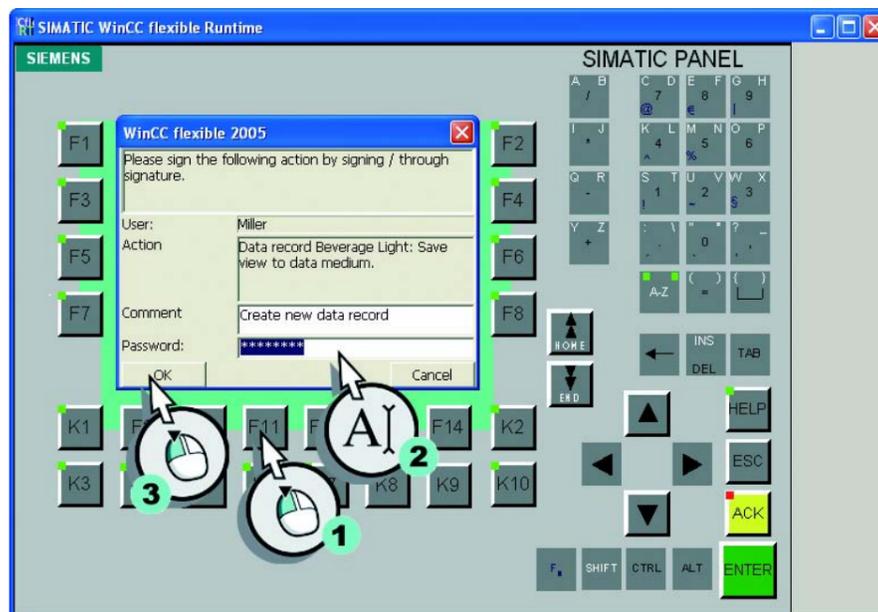


3. Change to the "Recipe view", then create a new recipe data record.



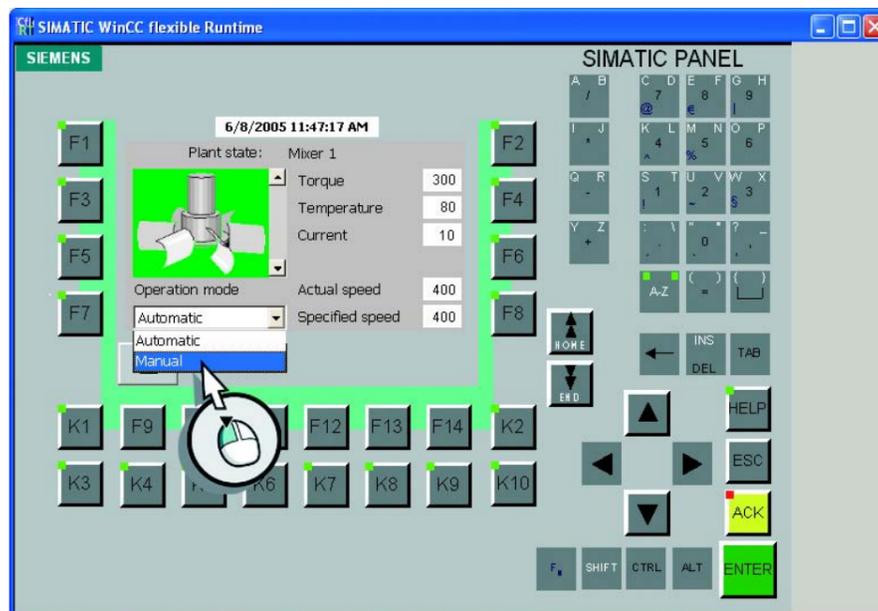
2 Using Audit

4. Save the new recipe data record (1), comment the change (2), and then confirm this action with your electronic signature (3):



Adapting the mixer speed

1. Change to the "Plant state" screen, then toggle the plant operating mode:



You are also requested to confirm your action when you toggle the plant operating mode.

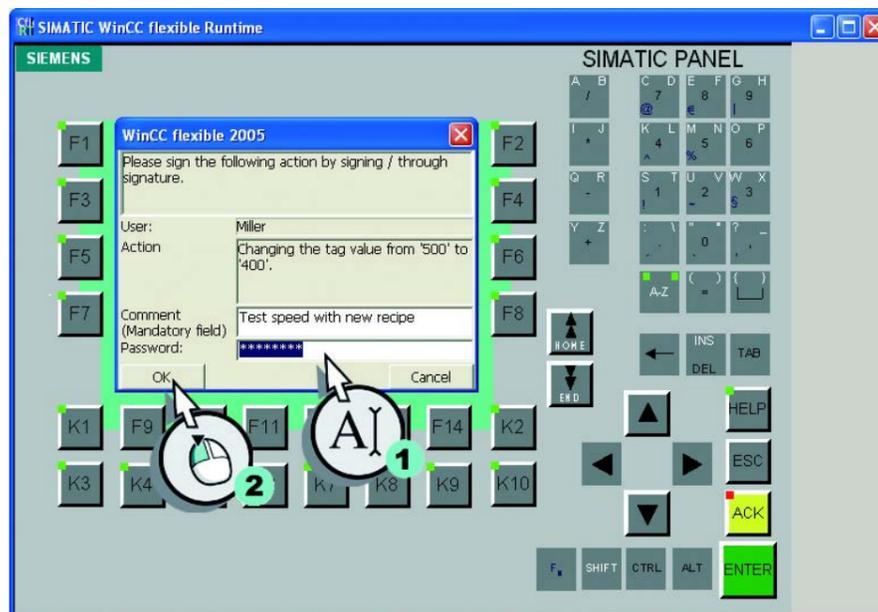
2. Enter "500" as the new setpoint speed.

2 Using Audit

Use the "password" as an electronic signature.



3. Comment the modification and confirm this action with your electronic signature:



You can only operate a regulated project on the HMI device as long as audit-relevant user actions can be saved to the Audit trail file. Hence, you should always make allowances for sufficient memory space, and ensure that the server connection is not down. Operators require administrator rights to force operation in case of insufficient memory space.



2.5 Backup of Audit Trails

The Audit Trail file is an important document, and should thus be backed up at regular intervals. Available backup strategies:

- You save the Audit Trail file to the external memory medium of the HMI device, and transfer a backup copy to a server at regular intervals via the network.
- Save the Audit Trail file to the external memory medium of the HMI device, and then read the Audit Trail from this medium on a PC.
- You backup the Audit Trail file directly to the server via the network.

2 Using Audit

You can also assign the function list shown to the "Press" event of a button, for example. This always allows you to create a backup copy of the Audit Trail file on the server.

Little available memory, critical:

Event occurs, if the minimum amount of configured memory has been reached.

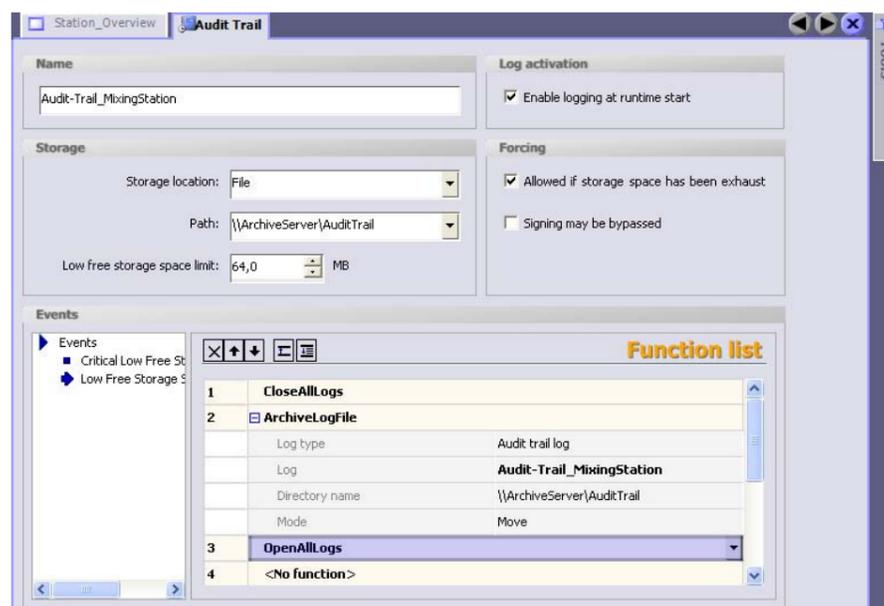
Little available memory:

Event occurs, if the normal amount of configured memory has been reached.



Moving Audit Trail to a server

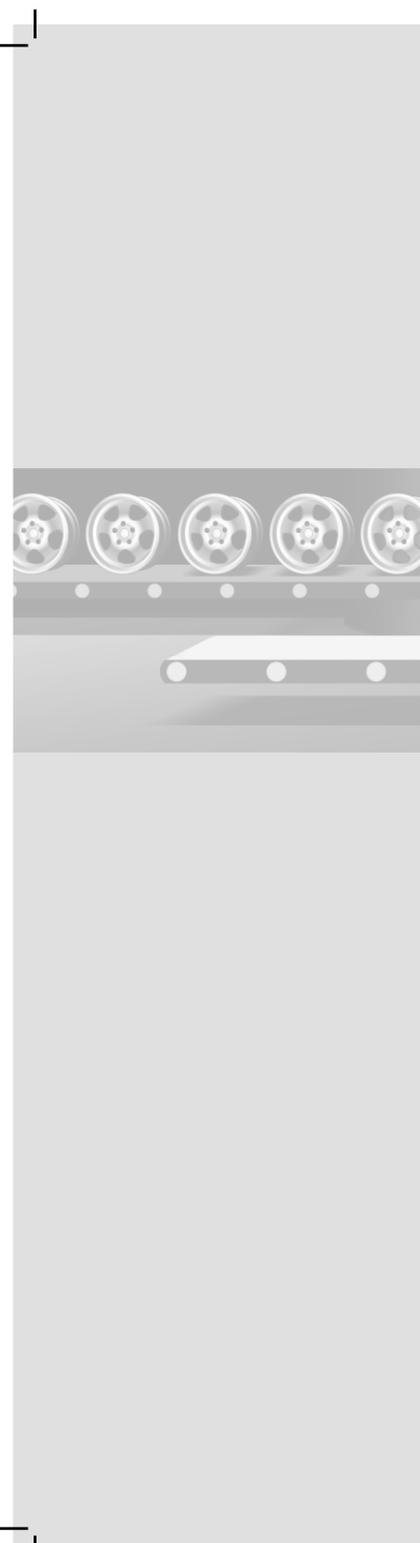
When the system runs below the configured minimum storage space, it outputs the event "Insufficient storage space." Configure the following function list to move the Audit Trail file from the external storage medium of the HMI device to the server:



The function list shown will be processed as follows:

- All log files will be closed.
- The Audit Trail is renamed on the HMI device with a time stamp with the following name: Name_Date_Time_HMIdeviceName, e.g., "Audit-Trail_MixingStation_20050524_122358_MixingStation". Next, the Audit Trail file will be moved to the server.
- All closed log files will be opened again.

You may also use this function list to create a long-term backup of the Audit Trail file on the server. Create a task in the tasks scheduler that backs up the "Backup Audit Trail" task which saves the Audit Trail to the server at regular intervals.

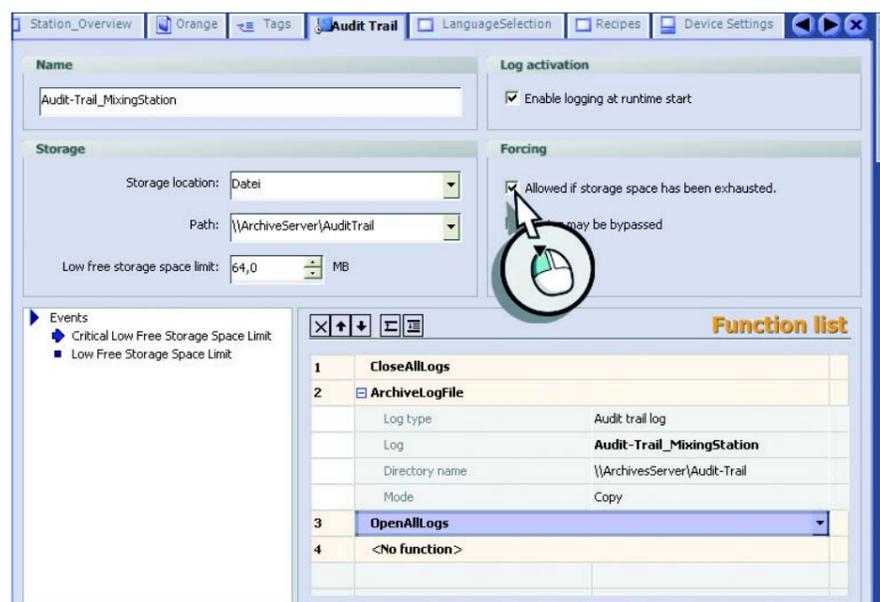


What happens when the server connection is down? The system continues to record user actions in the Audit Trail file, provided the storage medium of the HMI still provides sufficient space. The Runtime system makes an attempt to move the renamed Audit Trail file to the server at intervals of 300 s.

If it is no longer possible to write to the Audit Trail file as a result of insufficient storage space, it is no longer possible to operate GMP-relevant objects (tags, for example.)

Forcing operation

However, in order to avoid unnecessary down times, users of the “Administrator” group, such as the shift manager, may force access. This operation interrupts recording of the Audit Trail.



2 Using Audit

Forced operation will be recorded in the Audit Trail file.

	A	B	C	D	E	F	G	H
88	0	17.06.2005	12:07	+8:00	System	Application	Startup of WinCC flexible RT 2005 on device MP3	OERDBH
89	375	17.06.2005	12:07	+8:00	System	Application	Change to operating mode 'online'.	PQXjYu
90	376	17.06.2005	12:07	+8:00	System	User administratio	Password list imported successfully.	WDzqgt
91	377	17.06.2005	12:07	+8:00	Miller	User administratio	User 'Miller' logged on with group 'Group (9)'. Category: Object\Signed: Desc.: ConfirmationType(Electronic signa	7qpdC+
92	378	17.06.2005	12:08	+8:00	Miller	Logs: AuditTrail_N	Start Audit Trail \Storage Card\Logs\AuditTrail\Au	717zb1
93	379	17.06.2005	12:08	+8:00	Miller	Logs	Close all logs.	8PAYuR
94	380	17.06.2005	12:08	+8:00	Miller	Logs	Log files closed.	11n36e
95	0	17.06.2005	12:08	+8:00	System	Logs	Log files open again.	W3tkJD
96	0	17.06.2005	12:09	+8:00	System	Logs	Log files open again.	W3tkJD
97	381	17.06.2005	12:09	+8:00	Miller	Script: Button in S	Start Change Values In Script	/Rtlf/
98	382	17.06.2005	12:09	+8:00	Miller	Tag: AuditTags\F	Changing the tag value from '255' to '123'.	fbRxlo
99	383	17.06.2005	12:09	+8:00	Miller	Tag: AuditTags\F	Forced: Changing the tag value from '22' to '32'.	daXoPO
100								
101								
102								
103								
104								

The Audit viewer is located on the WinnCC flexible CD3 in the "Support\Audit Viewer" folder.



2.6 Evaluating Audit Trails in AuditViewer

The Audit Trail file was saved to the memory card of the HMI in CSV format and is read only. Each entry has a separate checksum. This checksum ensures that the entry has not been modified at any later time.

There are two possibilities to evaluate the Audit Trail:

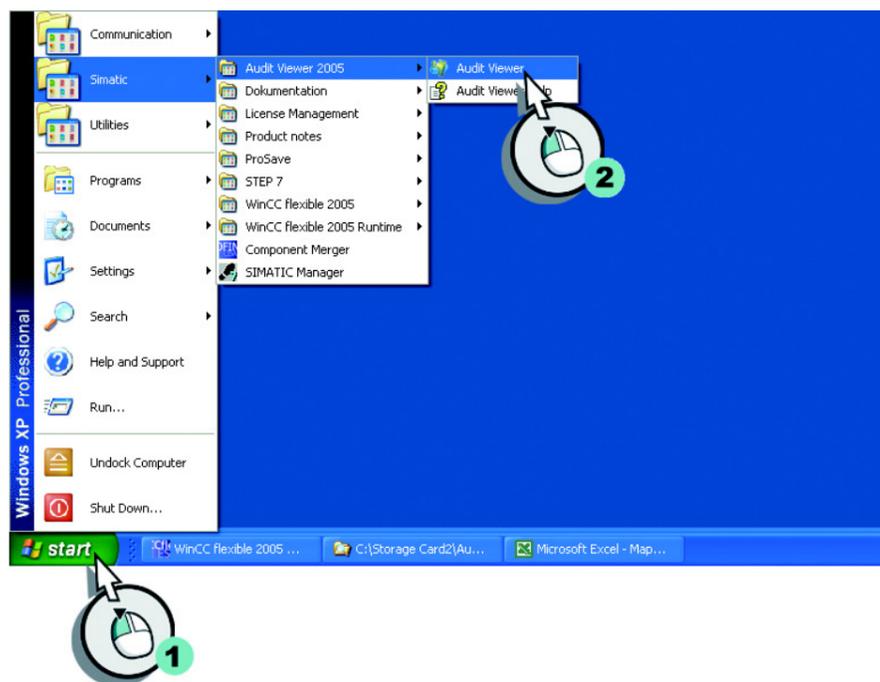
- Use the "Audit Viewer":
With the help of the Audit viewer you can comfortably evaluate the Audit Trail for external analysis on an Office PC.
- Use the "HmiCheckLogIntegrity" DOS program:
With the help of the DOS program an automatic check of the Audit Trail in Batch mode via the return values is possible.

2 Using Audit

Then, copy the Audit Trail onto the configuration computer and show it in the Audit Viewer.

1. Change to the “Plant state” screen on the HMI device, and then copy the Audit trail file from the HMI device to the configuration computer.

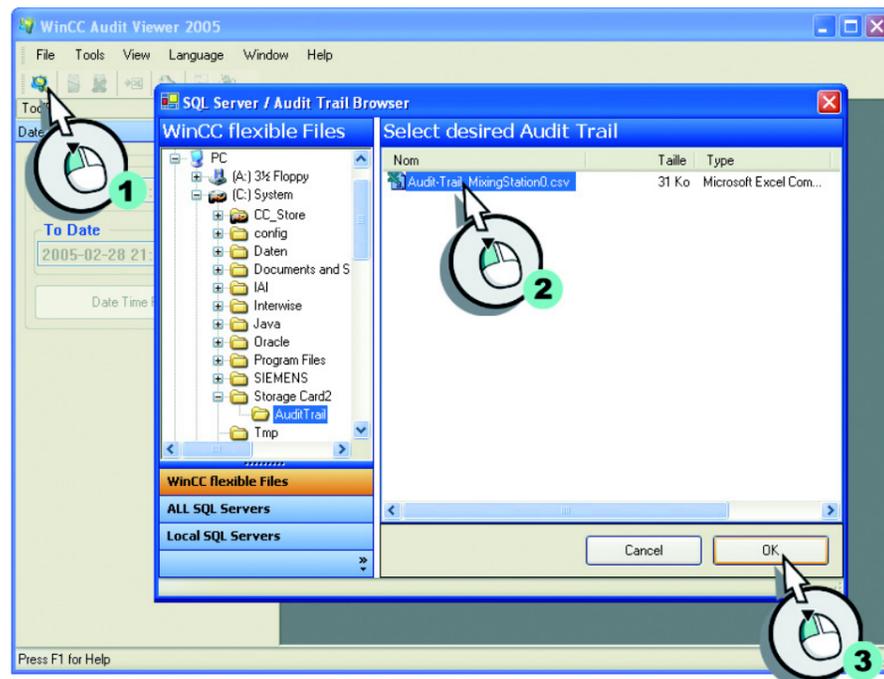
2. Run Audit Viewer on the master control PC or on the configuration computer:



In Audit Viewer, you comfortably evaluate the Audit Trails generated by WinCC flexible Runtime. The checksum of each Audit Trail verifies integrity of the contents.
Under "Custom" you can individually evaluate a loaded Audit Trail with SQL commands.

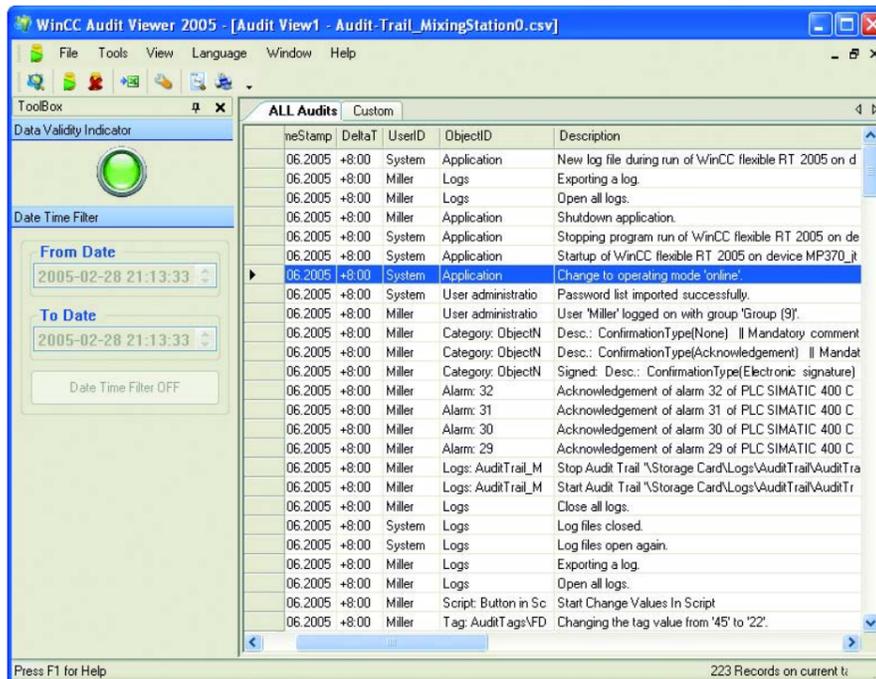


3. Load the Audit Trail:



2 Using Audit

The “Data Validity” LED is lit in green color to indicate that the loaded Audit Trail has not been manipulated. Each entry in Audit Trail is time-stamped to allow precise tracking of operator actions. In addition to system alarms, such as the attempt to import a password list, the system also records failed logon attempts:

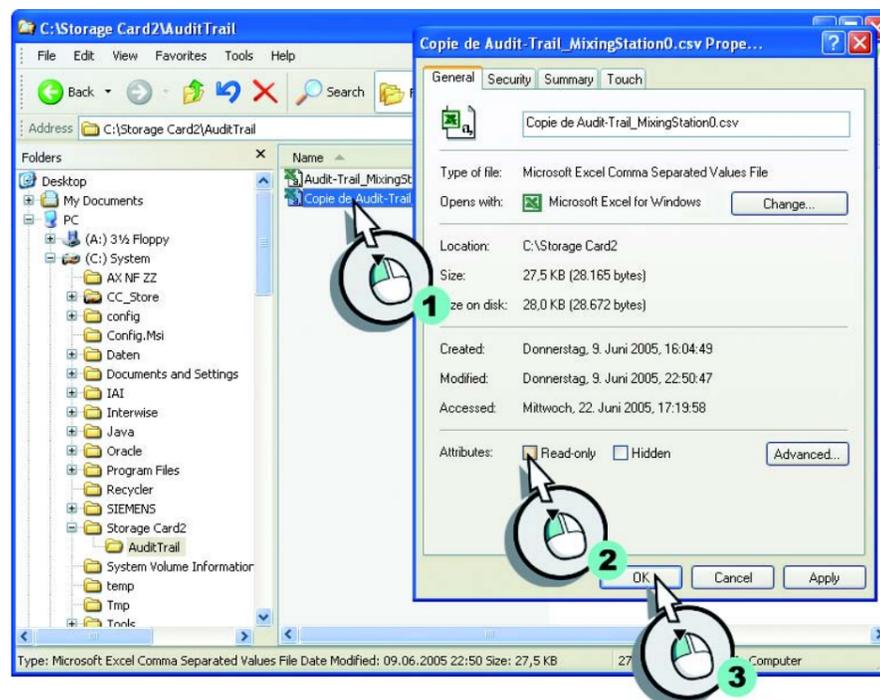


Verifying Audit Trail integrity

Each Audit Trail represents a vital document for your mandatory proof of actions. It is therefore essential to ensure full integrity of the Audit Trail file. Operators may attempt to conceal operating errors, or the automatic backup has failed due to a transmission error, for example.

Use AuditViewer to check whether the Audit Trail has been manipulated.

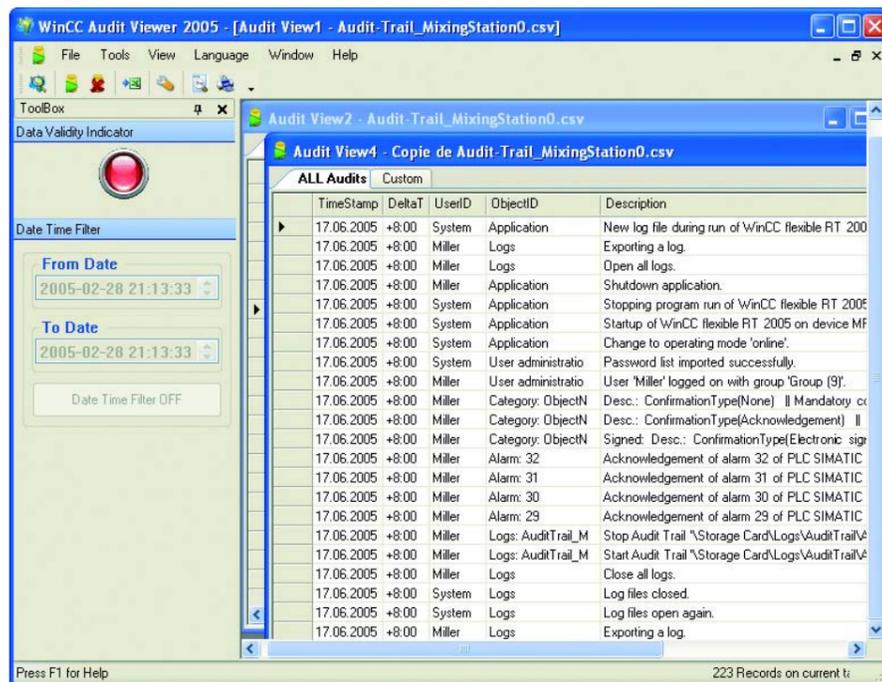
1. Create a copy of the Audit Trail on your engineering computer, and then remove the write protection:



2. Open the Audit Trail file in MS Excel, and then make some random changes.

2 Using Audit

3. Save the Audit Trail in CSV format, and load it again in AuditViewer:



"Data Validity" is lit in red color if the Audit Trail has been manipulated. The Audit Trail is thus rendered invalid, and will no longer be accepted by an FDA inspector.

2.7 Evaluating Audit Trails with DOS program

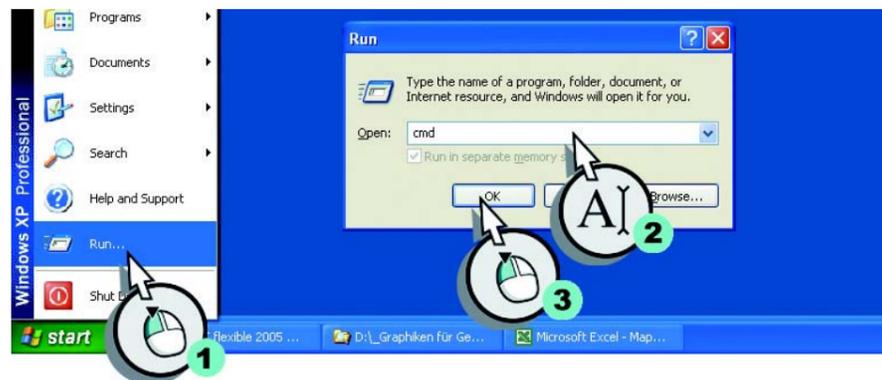
During long term archiving of Audit Trails on a server, it is generally possible to automatically check the Audit Trails with return values in a script. In addition the programmer can integrate the check using the DOS program "HmiCheckLogIntegrity" into the archiving process. "HmiCheckLogIntegrity" then provides the following return values:

- < 0: Different errors for example, wrong file format or no file exists.
- 1: The checked Audit Trail is valid.
- > 0: Line numbers in which the checked Audit Trail was manipulated.

Archiving the Audit Trail is only continued with a new return value of "1". In both error cases, the administrator or the shift supervisor can be informed, for example.

In this Getting Started the integrity of the Audit Trail is checked in the command line.

1. Change to the "Plant state" screen on the HMI device, and then copy the Audit trail file from the HMI device to the configuration computer.
2. Open the command line input on the configuration computer:



2 Using Audit

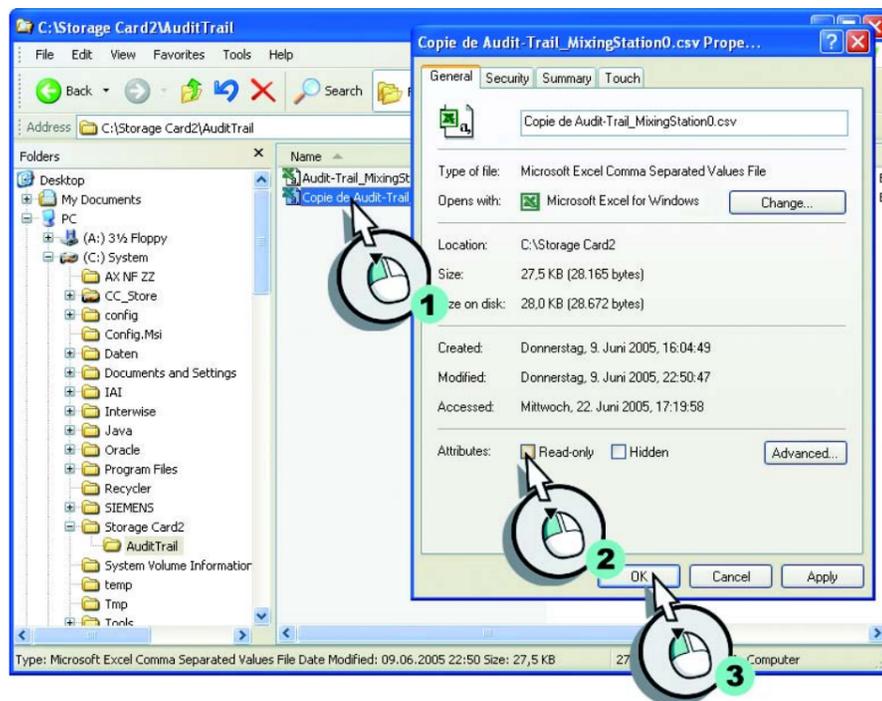
3. Check the integrity of the Audit Trail file:



```
C:\Documents and Settings\rj2903.WW004\Application Data\Microsoft\Internet Explorer\Quick Launch\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\WINNT\system32>cd\
C:\>
C:\>cd C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime
C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime>HmiCheckLogIntegrity.exe "C:\Storage Card2\AuditTrail\Audit-Trail_MixingStation0.csv"
CheckLogIntegrity utility
Checking file "C:\Storage Card2\AuditTrail\Audit-Trail_MixingStation0.csv" for consistency
Consistency check succeeded
C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime>
```

You have successfully completed the integrity check. We will now manipulate the Audit Trail and then check it again.

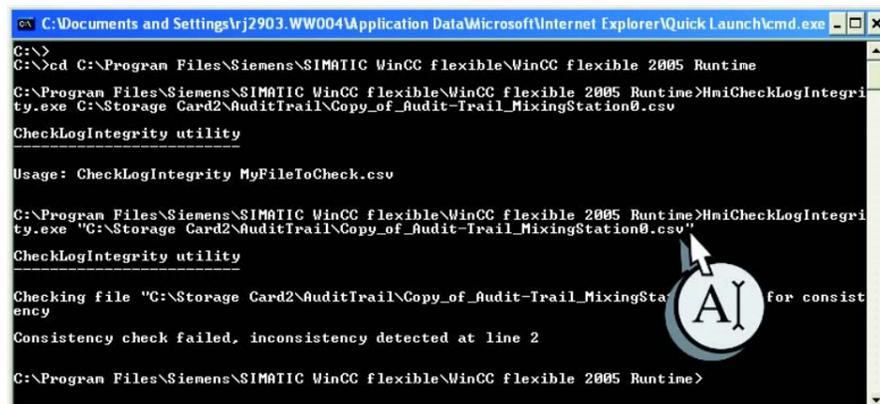
4. Create a copy of the Audit Trail on your engineering computer, and then remove the write protection:



5. Open the Audit Trail file in MS Excel, and then make some random changes.

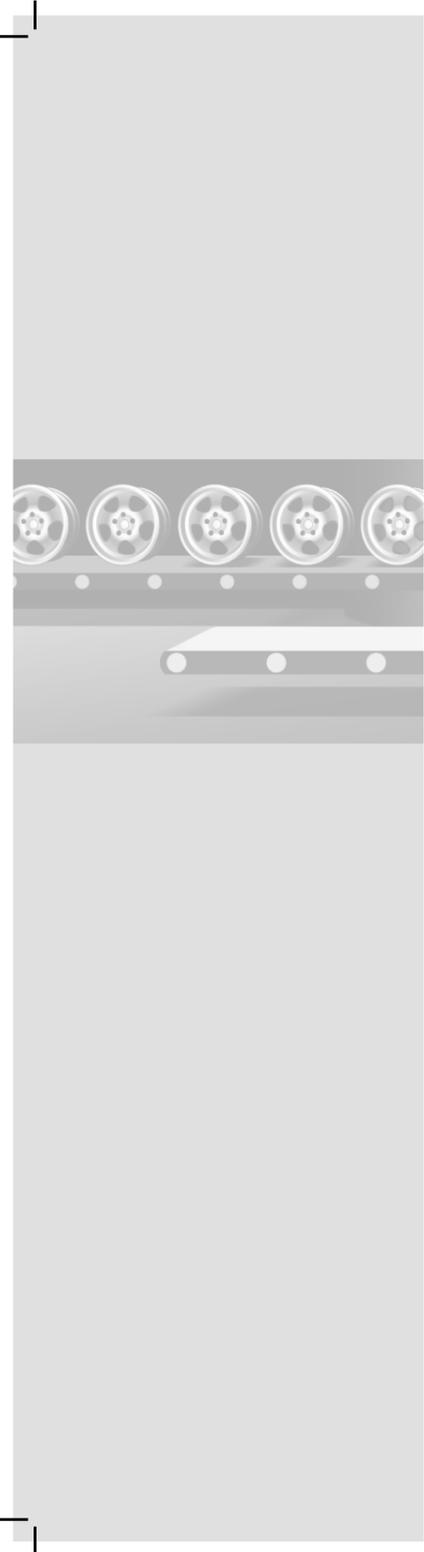
2 Using Audit

6. Save the Audit Trail file in CSV format, and then repeat the integrity check:

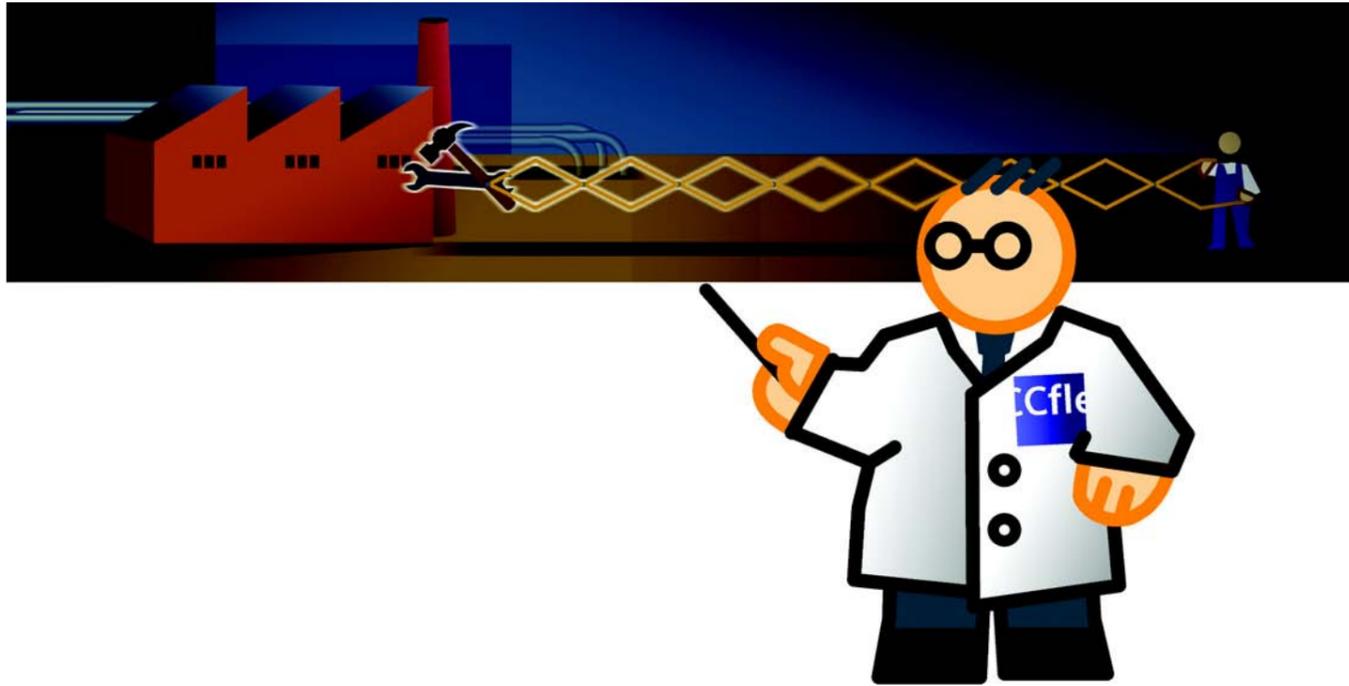


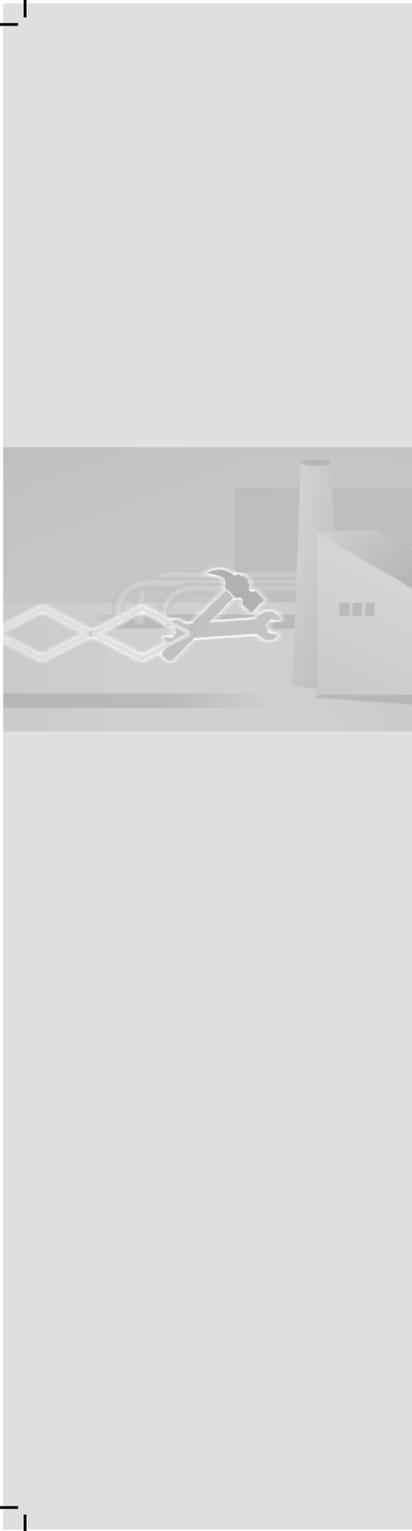
```
C:\Documents and Settings\j2903.WW004\Application Data\Microsoft\Internet Explorer\Quick Launch\cmd.exe
C:\>
C:\>cd C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime
C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime>HmiCheckLogIntegrity.exe C:\Storage Card2\AuditTrail\Copy_of_Audit-Trail_MixingStation0.csv
CheckLogIntegrity utility
Usage: CheckLogIntegrity MyFileToCheck.csv
C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime>HmiCheckLogIntegrity.exe "C:\Storage Card2\AuditTrail\Copy_of_Audit-Trail_MixingStation0.csv"
CheckLogIntegrity utility
Checking file "C:\Storage Card2\AuditTrail\Copy_of_Audit-Trail_MixingStation0.csv" for consistency
Consistency check failed, inconsistency detected at line 2
C:\Program Files\Siemens\SIMATIC WinCC flexible\WinCC flexible 2005 Runtime>
```

The integrity check has failed. The Audit Trail is thus rendered invalid, and will no longer be accepted by an FDA inspector.



3 Using Sm@rtAccess





3.1 What is Sm@rtAccess?

Principle

Sm@rtAccess allows remote access to process data, and the implementation of cost-effective client/server solutions in the machine-oriented domain:

- Sm@rtClient concept
Remote control or monitoring of an HMI from another HMI system.
- Communication between HMI systems
Read/write access to tags of remote HMI systems, based on the "SIMATIC HMI HTTP protocol."
- Integration of panels into the MS Office World
Read/write access of MS Excel to tags of remote HMI systems, based on the "Simple Object Access Protocol" (SOAP).

In our fruit juice mixing system example, the shift manager can thus access and control essential process data of all stations remotely from his workplace (master control station.) The marketing manager, on the other hand, uses MS Excel (on his office PC) to obtain stock and production volume data.

Engineering tasks in particular:

- Configuring the MasterControlStation (master control PC)
- Setting up remote control of the the (DoNotTranslate[MixingStation (OP 270)
- Viewing process data of the MixingStation (OP 270)

3.2 Configuring the MasterControlStation (master control PC)

We shall use the “GettingStarted_Options” project to configure the master control PC. The “MasterControlStation” master control PC has already been added to this project, and a plant overview screen was configured.

The self-extracting archive Project_GettingStarted_Options_WinCC_flexible_2005.exe in the “Documents[Language]\Getting Started” folder on your WinCC flexible CD3 contains the project, and is extracted to the default path: “C:\Temp”). The archive with “Complete” suffix contains the entire configuration.

1. Run WinCC flexible, and open the “GettingStarted_Options” project.



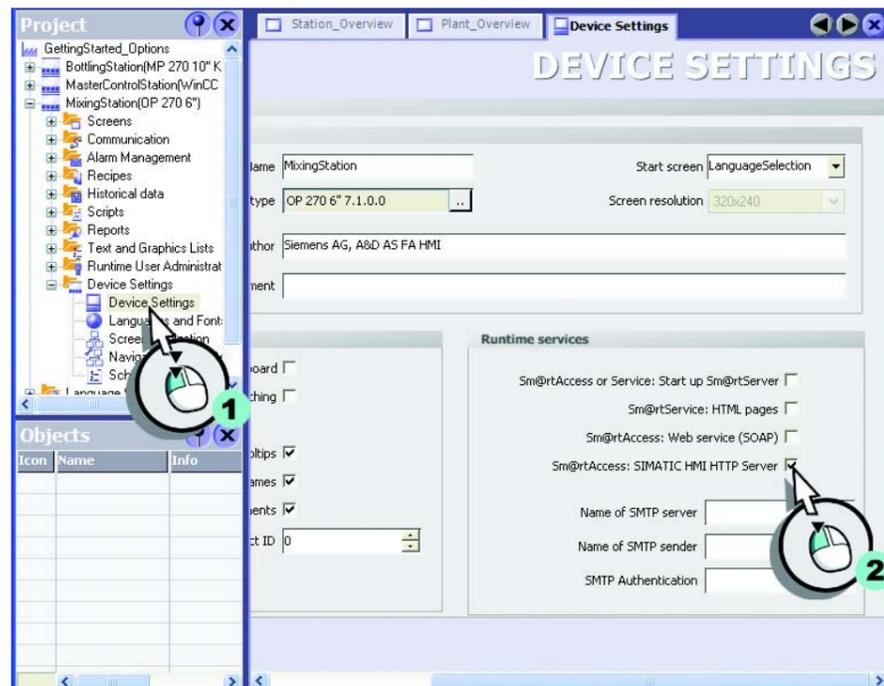
The shift manager uses the station overview screen to obtain information about essential operational data of the MixingStation: the fill levels of the reservoirs and the mixer speed.

The plant overview screen already contains space for operational data of the cleaning and filling systems. Those operational data, however, are insignificant for this Getting Started and are thus not configured.

Setting up the connection between the master control PC and the HMI

Data exchange between the “MasterControlStation” (master control PC) and the “MixingStation” (OP 270) HMI device is based on the “SIMATIC HMI HTTP Protocol.” The “MixingStation” HMI device is identified uniquely by its IP address 192.168.0.22.

1. Configure the “MixingStation” HMI device as an HTTP server:



2. Change to the “MasterControlStation” HMI device.

3 Using Sm@rtAccess

3. Add a new “MixingStation” connection so that the master control PC can display the operational data of the “MixingStation” :



4. Configure the connection:

The screenshot displays the 'CONNECTIONS' configuration window in WinCC flexible. It features a table with the following data:

Name	Communication driver	Online	Comment
MixingStation	SIMATIC HMI HTTP Protocol	On	

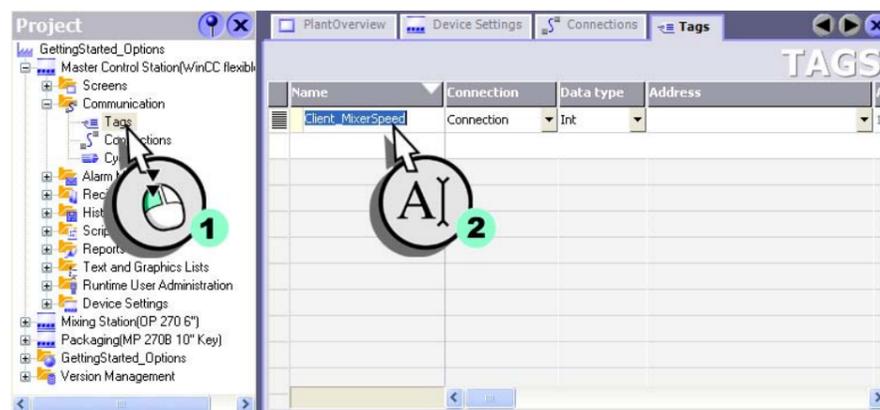
Below the table, the 'Parameters' section is visible, showing a diagram of the connection between 'WinCC flexible RT' and a 'Station'. The 'Interface' is set to 'Ethernet'. The 'Device web server' configuration includes the following fields:

- Address: http:// 192.168.0.22
- User name: [empty]
- Password: [empty]
- Timeout: 10 s
- Checkboxes: Allow invalid computer names for certificates, Allow expired certificates, Allow certificates signed by unknown authorities

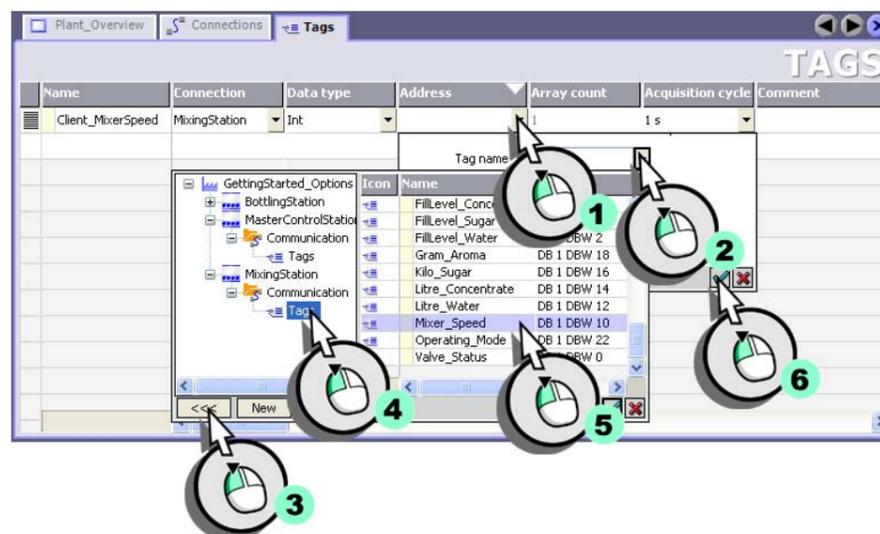
3 Using Sm@rtAccess

Output of mixer speed values on the plant overview screen

1. On the "MasterControlStation" master control PC, create the "Client_MixerSpeed" tag to which the mixer speed of the "MixingStation" is written:



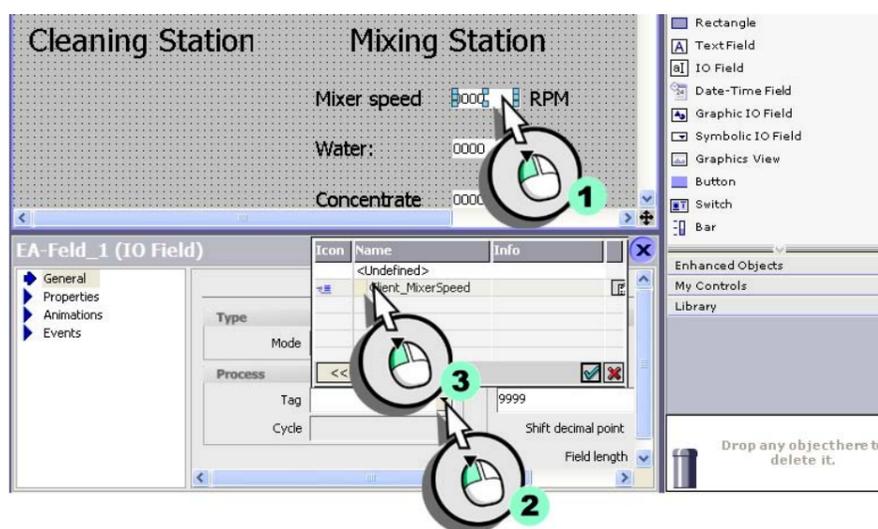
2. Select the "Mixer_Speed" tag from the "MixingStation" project as the address:



This configuration scenario is only feasible if both HMIs are assigned to the same project.



3. In the “PlantOverview” screen, interconnect the “MixerSpeed” IO field with the “Client_MixerSpeed” tag:



The mixer speed of the “MixingStation” is displayed in the IO field of the plant overview screen. You can create further tags on the master control PC for indicating filling levels and interconnect these with IO fields.

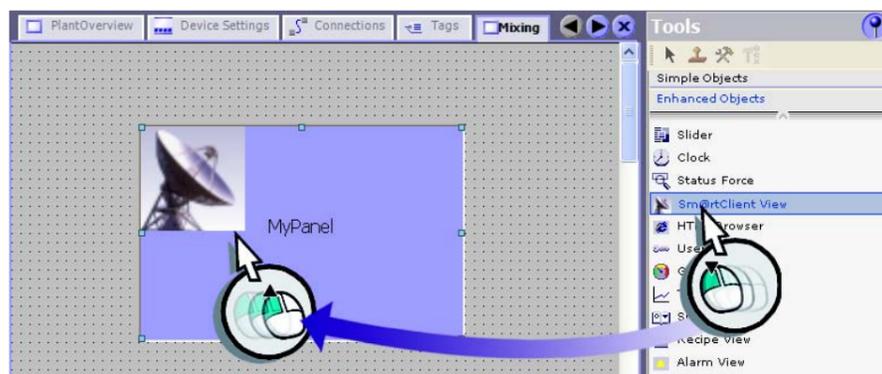
- Client_FillLevelWater: FillLevel_Water
- Client_FillLevelConcentrate: FillLevel_Concentrate
- Client_FillLevelSugar: FillLevel_Sugar
- Client_FillLevelAroma: FillLevel_Aroma

3.3 Setting up remote control of the Mixing Station (OP 270)

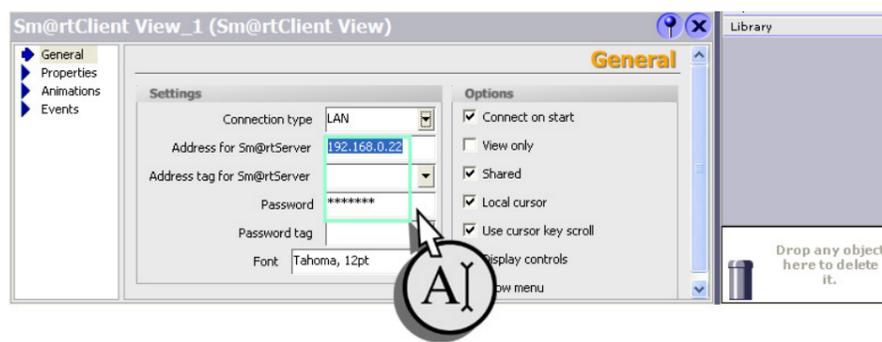
Principle

To allow intervention of the shift manager in the production process at any time from his master control station PC, we shall configure a remote control of the "MixingStation".

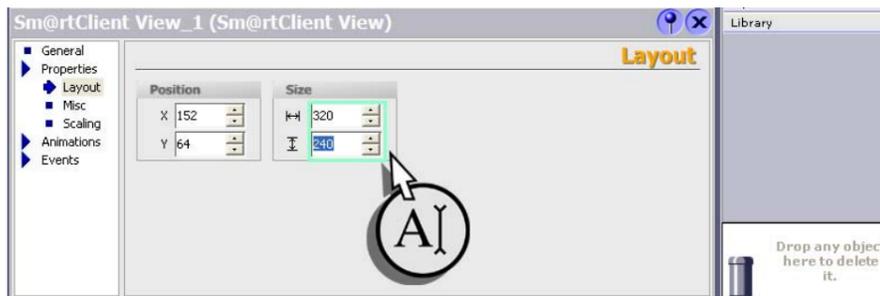
1. Create the "MixingStation" screen on the master control PC and add a Sm@rtClient view:



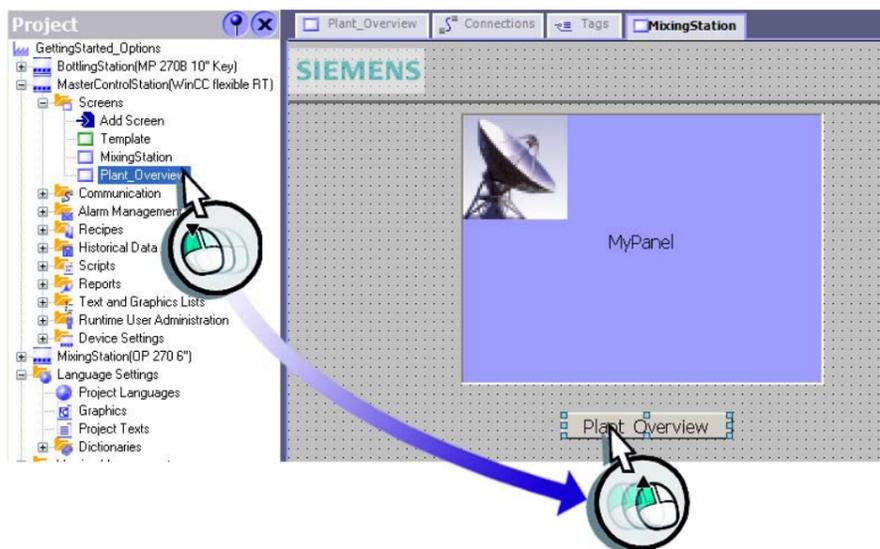
2. Configure the Sm@rtClient view so that it automatically connects to the OP 270 6" at the "MixingStation" (1) at the start of runtime. Enter "100" as the password (2):



3. Adjust the Sm@rtClient view to the display size of the OP 270 6":

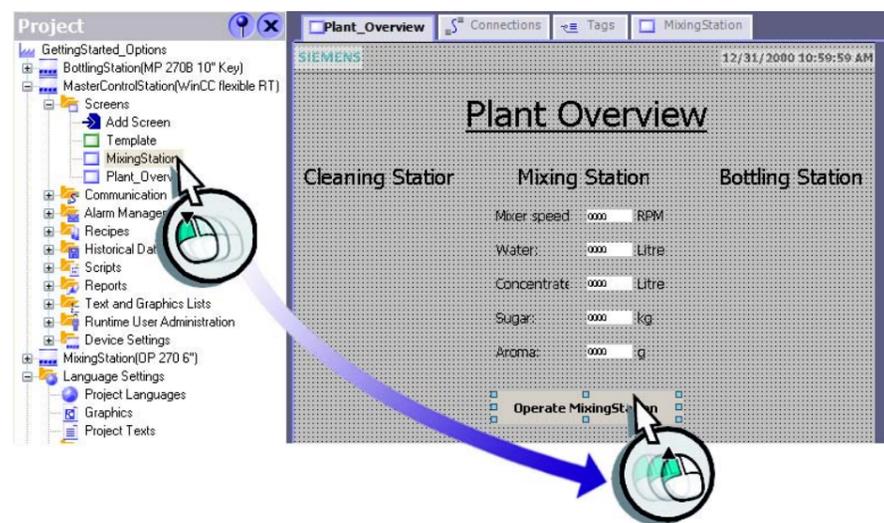


4. Create a screen change to the "PlantOverview" screen:

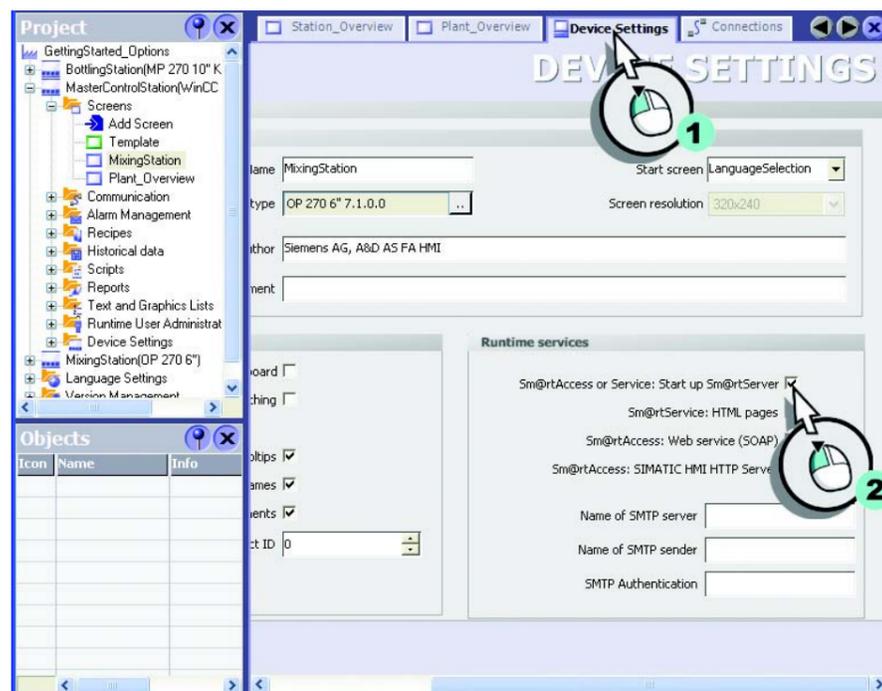


3 Using Sm@rtAccess

5. In the same way, create a screen change from the "PlantOverview" screen to the "MixingStation" screen.



6. Finally, enable remote control at the “Mixing Station” (OP 270 6”) :



A change of the IP address is accepted only after a restart of the HMI device.



7. Verify the following ControlPanel settings for OP 270 6”:

- The NE2000-compatible CF Card is assigned IP address 192.168.0.22.
- Subnet mask of the NE2000 compatible CF cards is 255.255.255.0.
- Data transfer mode is set to Ethernet.

8. On the HMI device, call the loader menu to start the ControlPanel.

3 Using Sm@rtAccess

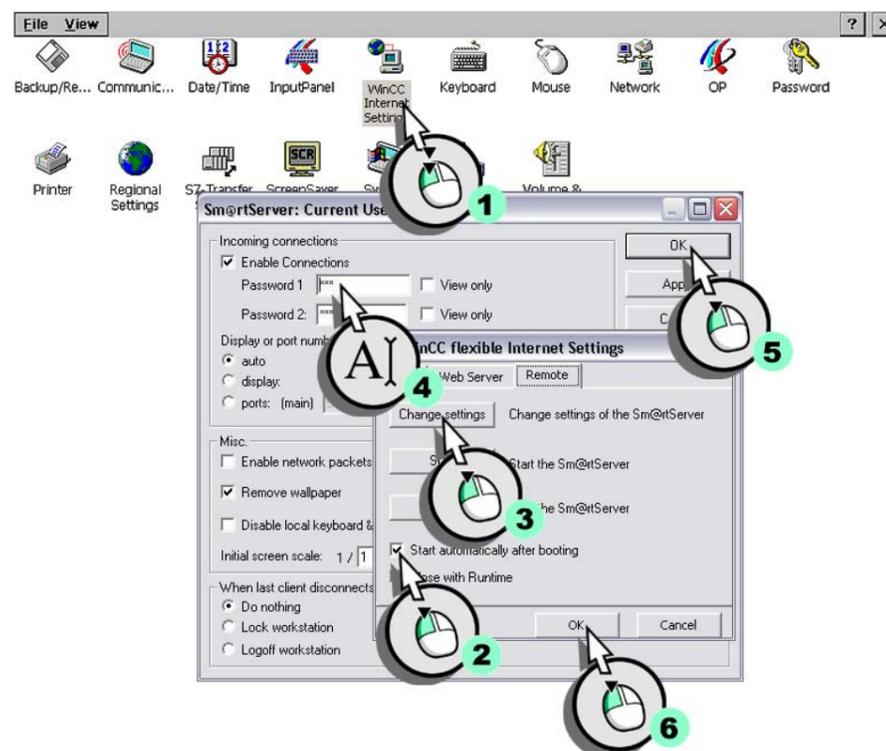


Access control settings such as passwords ensure that only authorized persons are granted access to the HMI device.



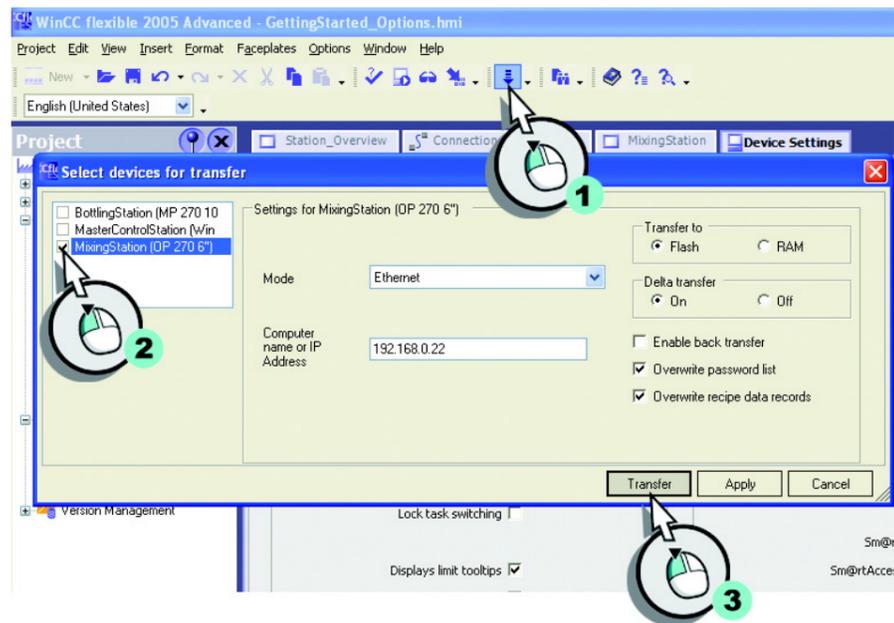
50

9. In the WinCC flexible Internet Settings dialog, set autostart for remote control (2), and enter the password "100" (4):



These are default settings on the HMI device. If you decide to enter a different password in the project, you also need to change it on the HMI device accordingly.

10. Transfer the project to the "MixingStation" HMI device:



3 Using Sm@rtAccess

The program code of the VBA macros is open source. Select "Options > Macro > Visual Basic Editor" to view the program code.



3.4 Displaying process data of the MixingStation (OP 270) in MS Excel

We shall use the "SOAP_Access" Excel file to enable quick access to production data for the sales department. The two VBA macros in this Excel file can be used by the shift manager to read or set the current mixer speed of the MixingStation. Those VBA macros represent basic implementations and are therefore not suitable for system operation.

The Excel file "SOAP_Access" is stored in the self-extracting file Project_GettingStarted_Options_WinCC_flexible_2005.exe.

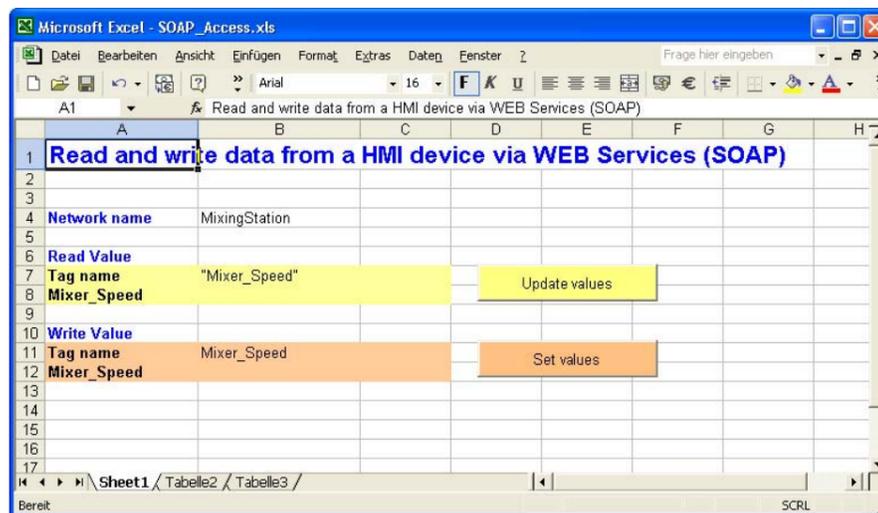
1. Verify that the following conditions are satisfied:

Microsoft SOAP Toolkit version < 3.0 is installed on the programming device (office PC.)

You can download Microsoft SOAP Toolkit from the Internet at "<http://msdn.microsoft.com/webservices>." Later versions of Microsoft SOAP Toolkit are not overwritten and may be used in parallel.

Creating a macro

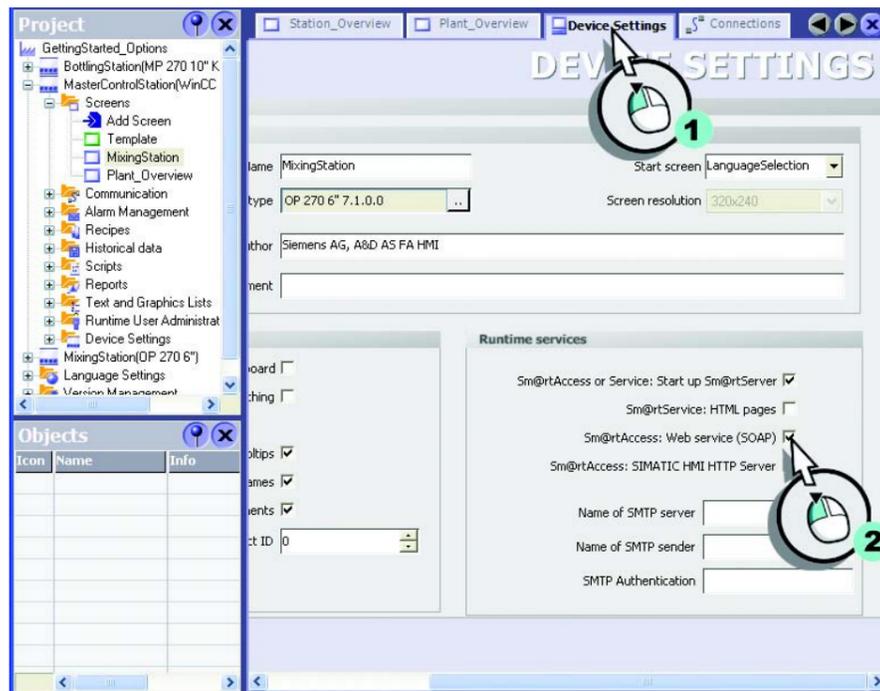
1. Launch MS Excel on the configuration computer and open the “SOAP_Access” file:



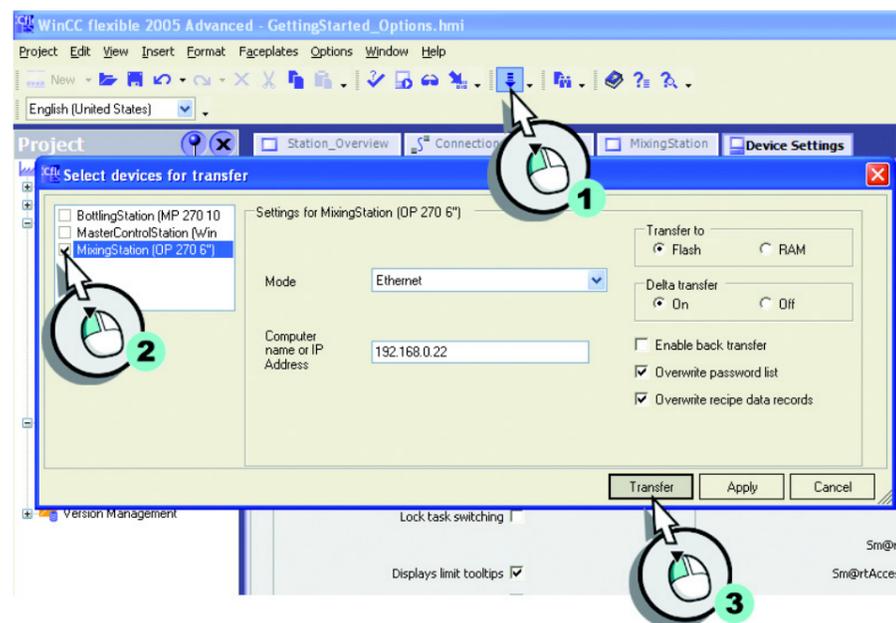
Click “Update values” to get and view the current value of the “Mixer_Speed” tag. The shift manager may use “Set values” to change the mixer speed.

3 Using Sm@rtAccess

2. In WinCC flexible, enable tag access for the "MixingStation" HMI device:



3. Finally, transfer the project to the "MixingStation" HMI device:

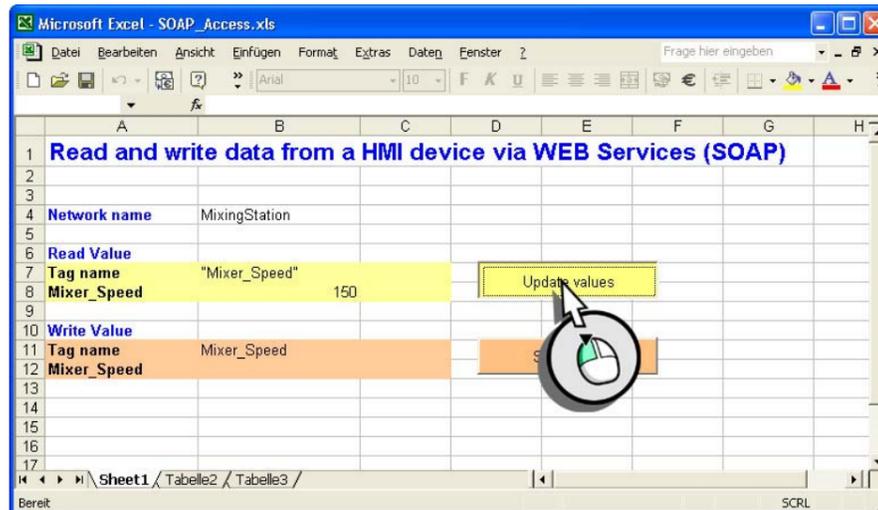


4. Verify that the following conditions are satisfied:

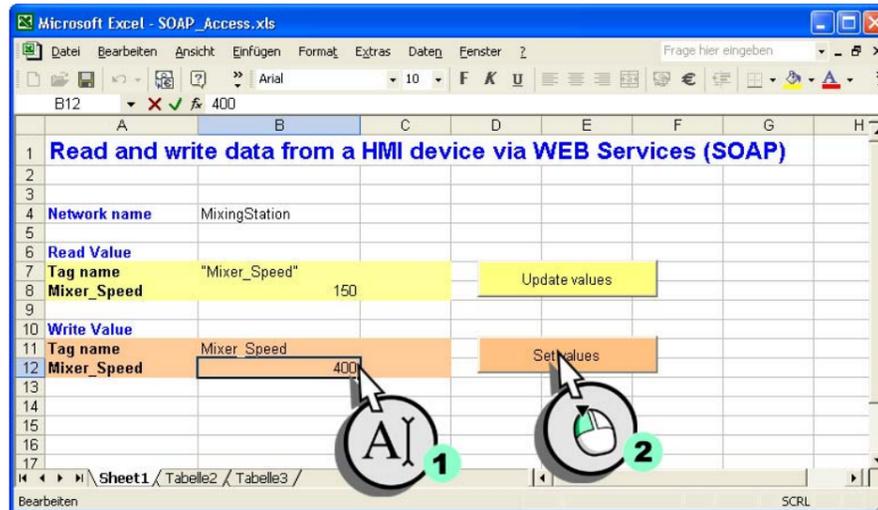
- On the HMI device in the ControlPanel under "Communication", the Device name (network name) is set to "MixingStation".
- The HMI device is entered in the lmhosts file (e.g. under c:\winnt\system32\drivers\etc).

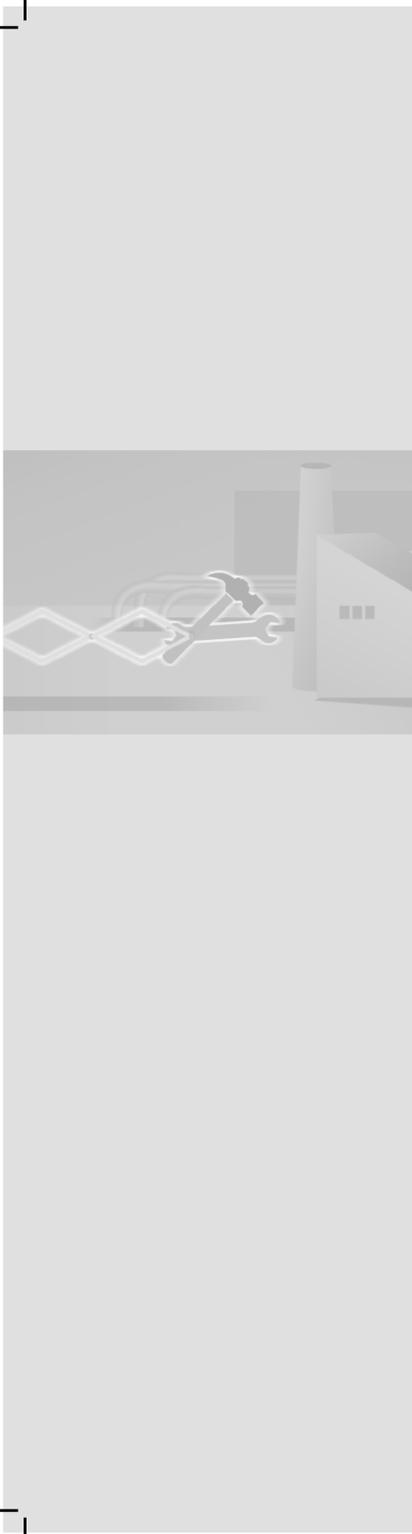
3 Using Sm@rtAccess

5. Show the current mixer speed in MS Excel:



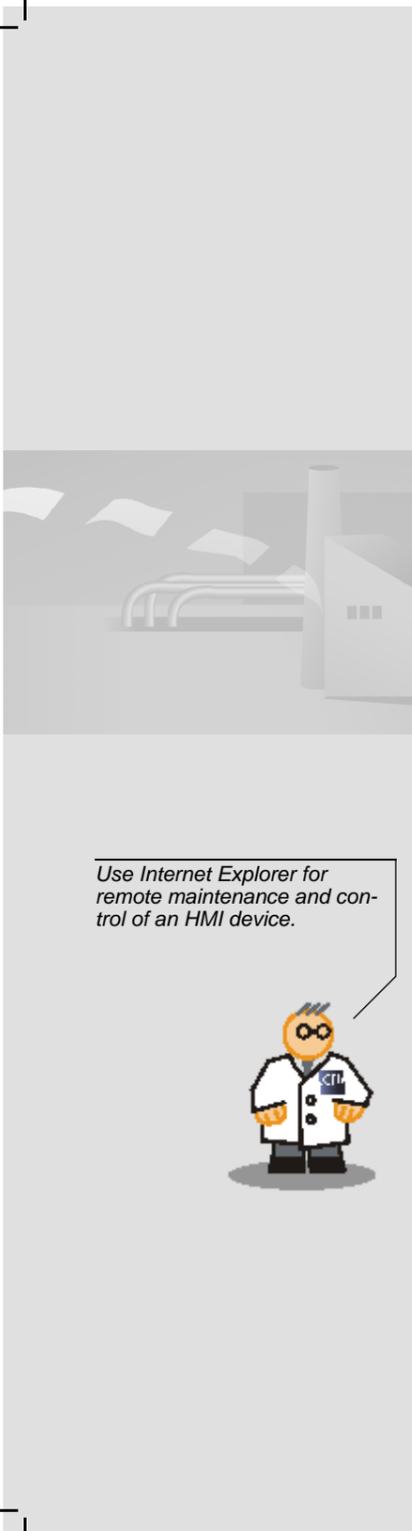
6. Set a mixer speed between 400 and 800.





4 Using Sm@rtService





4.1 What is Sm@rtService?

Sm@rtService supports remote control of HMIs via the Internet for purposes of servicing:

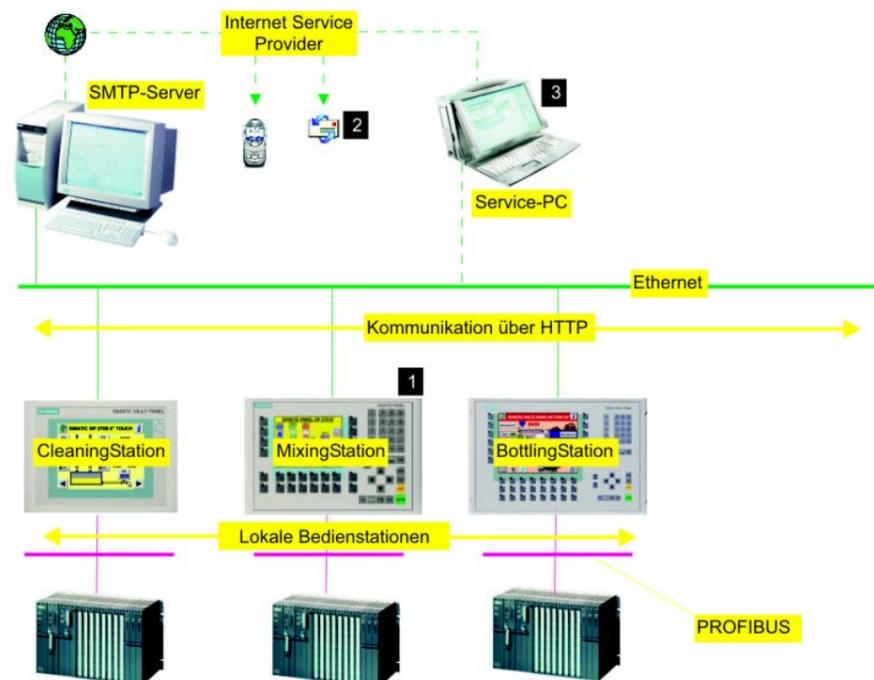
- Remote control via Internet/Intranet
Remote control of an HMI system with the help of Internet Explorer
- Access to service and maintenance data
Standard HTML pages on the HMI system, providing service / maintenance information and diagnostic functions
- E-mail support
Sending of e-mails on the basis of alarms and events

This reduces unscheduled shutdown periods and increases system productivity. Using our fruit juice mixing plant as an example, that means the service technician in charge will receive important messages by e-mail at his workstation. On the Internet, he can obtain status information from the diagnosis pages of the HMI.

4.2 Notifying the field service technicians by e-mail

In order to reduce shutdown periods of the fruit juice (MixingStation) to a minimum, messages of the "alarm" class should be made available to the responsible service technicians via e-mail.

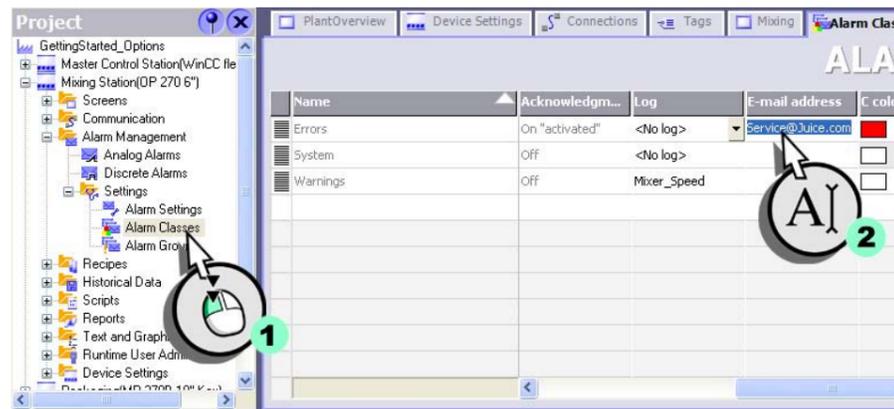
An SMTP server is required for sending e-mail and is usually accessible on the company network. A router can be used to establish the connection to the SMTP server:



Service event

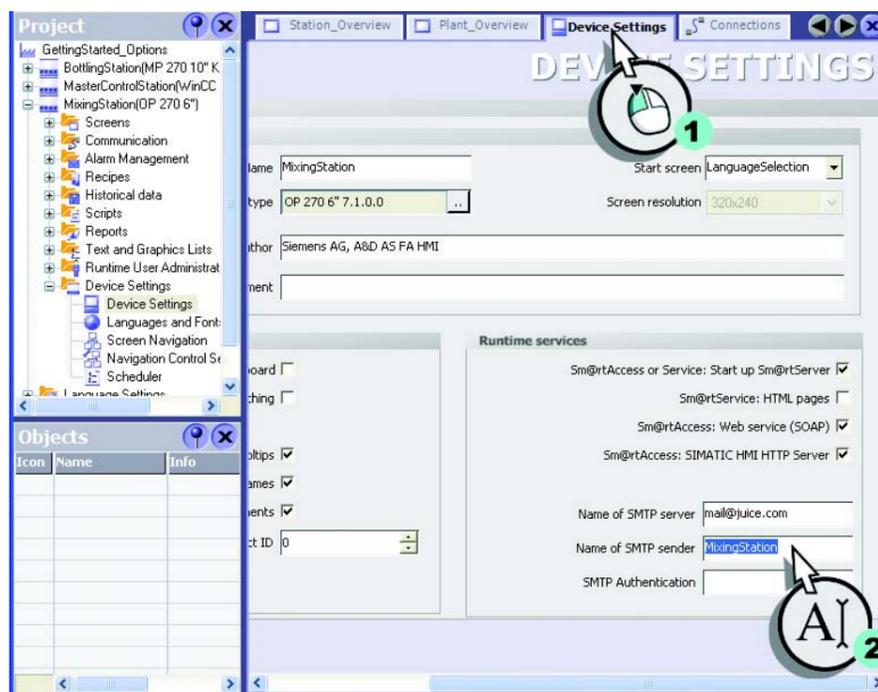
The (MixingStation) HMI outputs an e-mail message if an error occurs (1). The field service technician in charge receives this message (2). He then logs on to the HMI from his service PC (3).

1. Enter the e-mail address of the service technician in the (MixingStation) HMI for the "alarm" message class:



4 Using Sm@rtService

2. Enter the name of the SMTP server which will send the e-mail to the field service technician:



You can also define the SMTP server and the name of the sender directly on the HMI device ControlPanel, under "WinCC Internet Settings > Email."

Contact the plant owner if the e-mail provider also needs an email address for authentication. Enter the e-mail address in the "name of the SMTP transmitter" field.



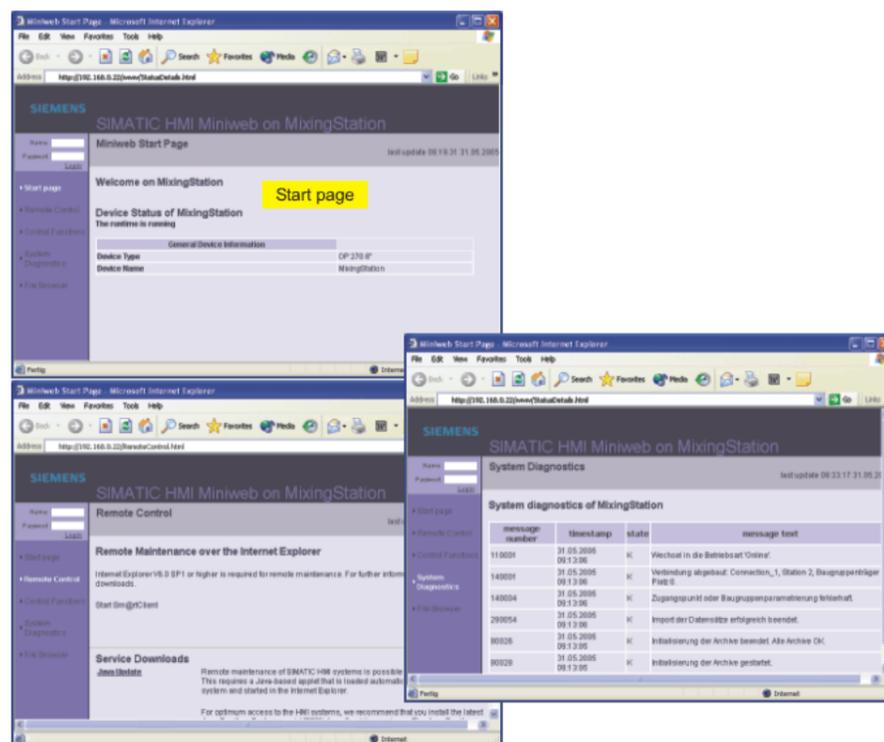
4.3 Viewing the HMI status

After the field service technician has received the e-mail, he should view the status information on the service pages of the HMI device.

To do so, he runs Internet Explorer on his service PC and logs on to the HMI homepage by entering the relevant IP address (<http://192.168.0.22>.)

On the start page, the field service technician can open further HTML pages for:

- Remote control of HMI systems
- Importing and exporting recipes
- Viewing the HMI status
- Performing a system diagnosis
- Calling a file browser



4 Using Sm@rtService

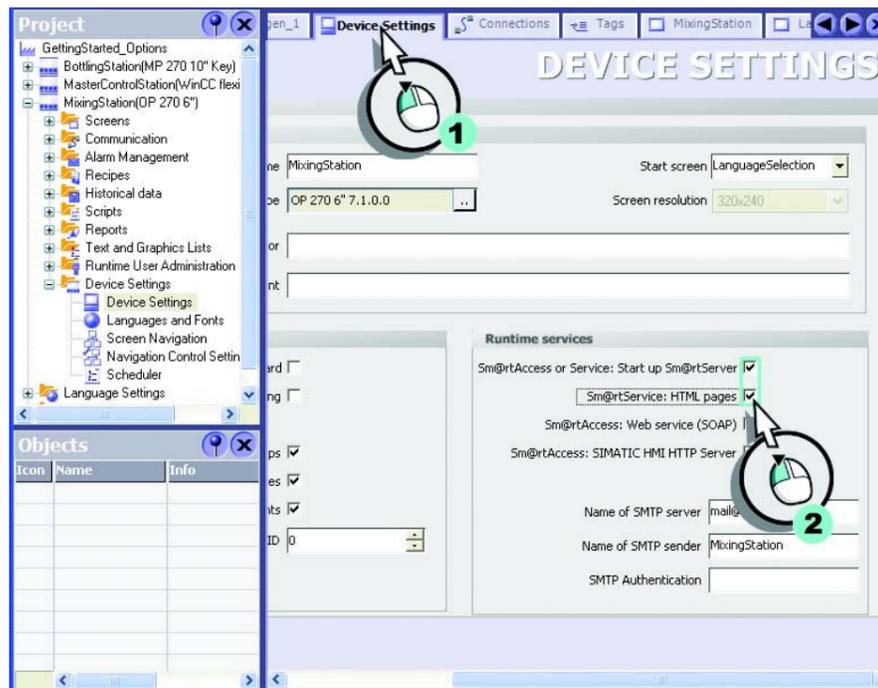


The service pages of the HMI are enabled with "Sm@rtServer HTML pages." Remote control of the HMI using Internet Explorer is enabled with "Start Sm@rtServer." You can enable those settings separately.



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1. Enable Sm@rtService functionality on the "MixingStation" HMI device:

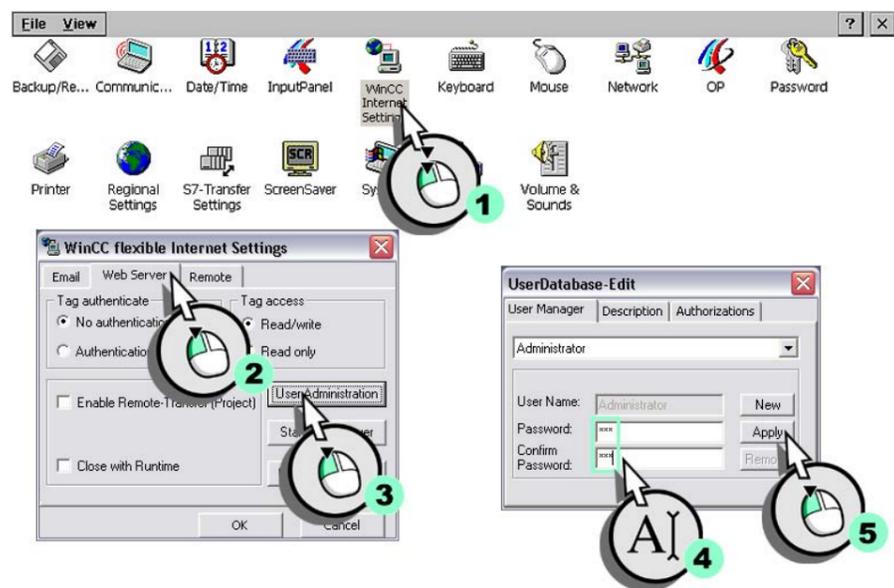


2. Verify the following ControlPanel settings for the OP 270 6" HMI device:

- The NE2000-compatible CF Card is assigned IP address 192.168.0.22.
- Subnet mask of the NE2000 compatible CF cards is 255.255.255.0.
- Data transfer mode is set to Ethernet.

A change of the IP address is accepted only after a restart of the HMI device.

3. Confirm that the “Administrator” password is set to “100” in the Control-Panel of the HMI device under “WinCC flexible Internet Settings/Web Server”:

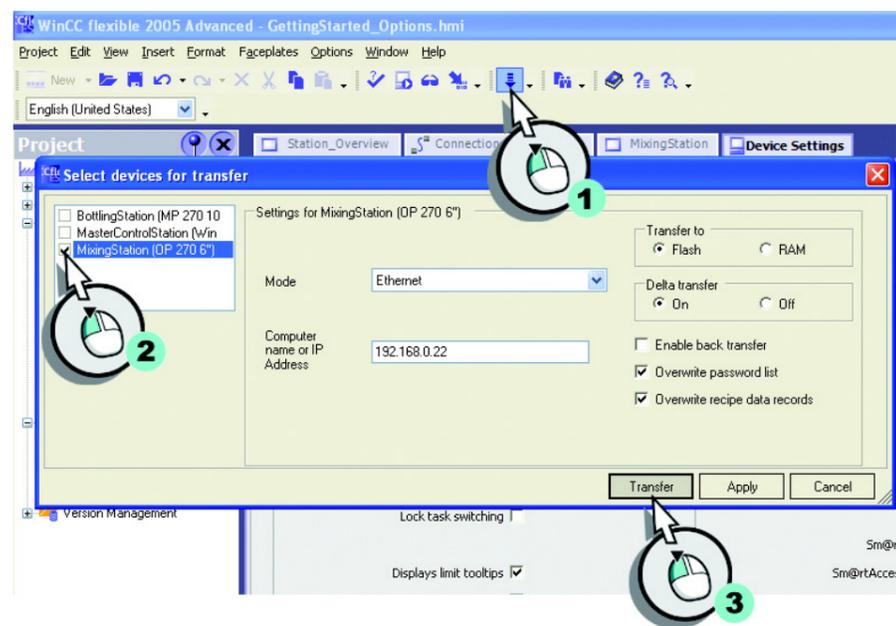


You can assign various access privileges ("User Administration > Authorizations") to control user access to the functions of the HTML pages of an HMI device. Passwords offer additional protection.

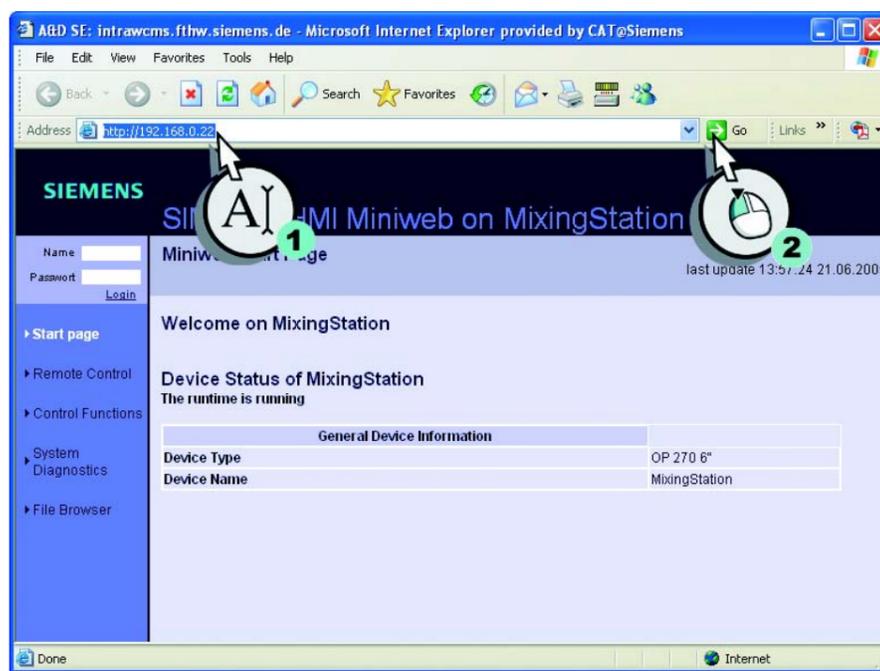


4 Using Sm@rtService

4. Transfer the project data to the "MixingStation" HMI so that you (and, later, the service technician) can access the service pages using Internet Explorer:

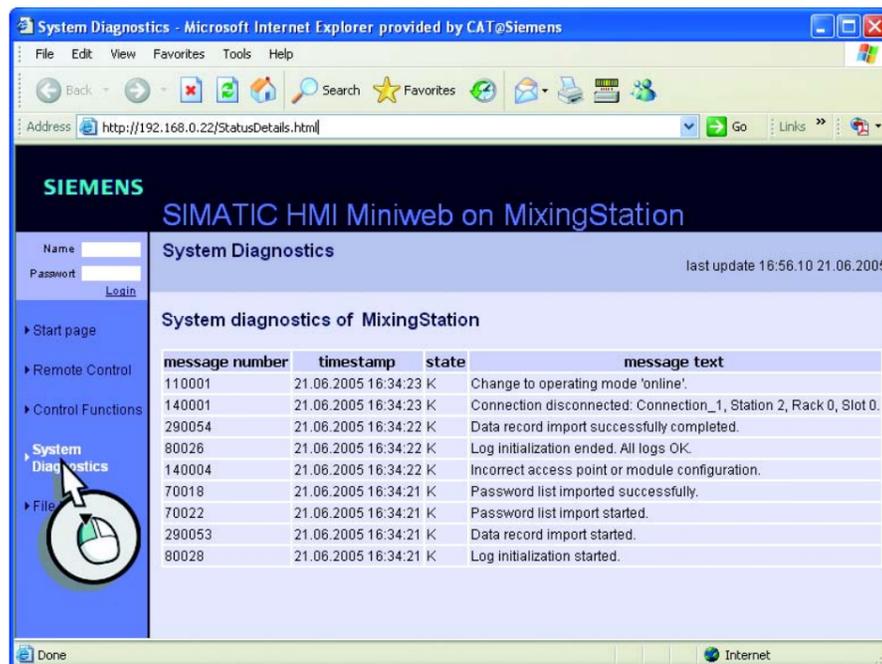


5. Run Internet Explorer on the programming device, then log on to the HMI "homepage" ("http://192.168.0.22"):



4 Using Sm@rtService

6. Check for any queued important system messages:



System Diagnostics - Microsoft Internet Explorer provided by CAT@Siemens

Address: <http://192.168.0.22/StatusDetails.html>

SIEMENS SIMATIC HMI Miniweb on MixingStation

Name: Password: Login

last update 16:56.10 21.06.2005

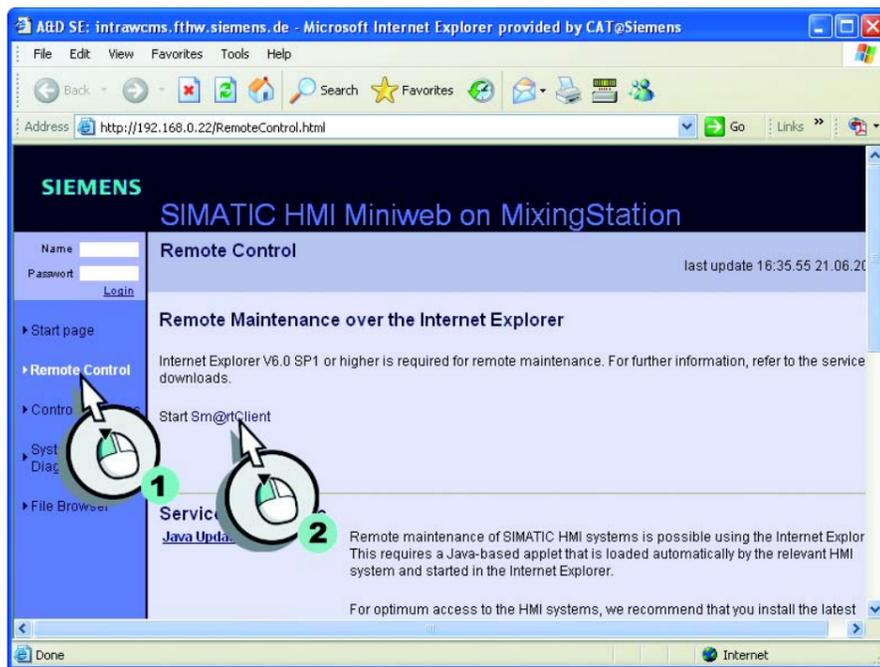
System diagnostics of MixingStation

message number	timestamp	state	message text
110001	21.06.2005 16:34:23	K	Change to operating mode 'online'.
140001	21.06.2005 16:34:23	K	Connection disconnected: Connection_1, Station 2, Rack 0, Slot 0.
290054	21.06.2005 16:34:22	K	Data record import successfully completed.
80026	21.06.2005 16:34:22	K	Log initialization ended. All logs OK.
140004	21.06.2005 16:34:22	K	Incorrect access point or module configuration.
70018	21.06.2005 16:34:21	K	Password list imported successfully.
70022	21.06.2005 16:34:21	K	Password list import started.
290053	21.06.2005 16:34:21	K	Data record import started.
80028	21.06.2005 16:34:21	K	Log initialization started.

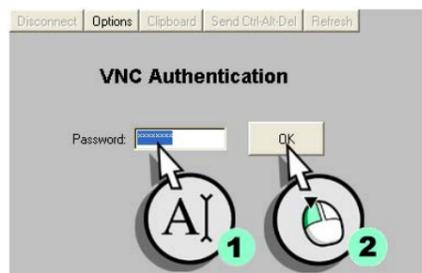
Done Internet

7. Return to the start page, then continue with remote control of the HMI device.

8. Start remote control...



9. ... and enter the password "100":



4 Using Sm@rtService

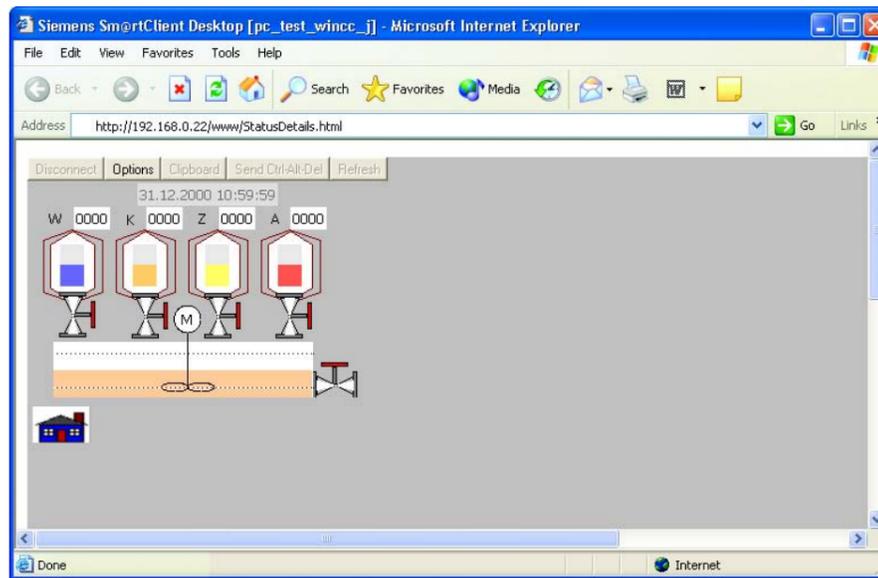


Assign the function key labels to buttons in order to execute the corresponding functions in Internet Explorer.



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The user interface of the HMI opens in Internet Explorer:



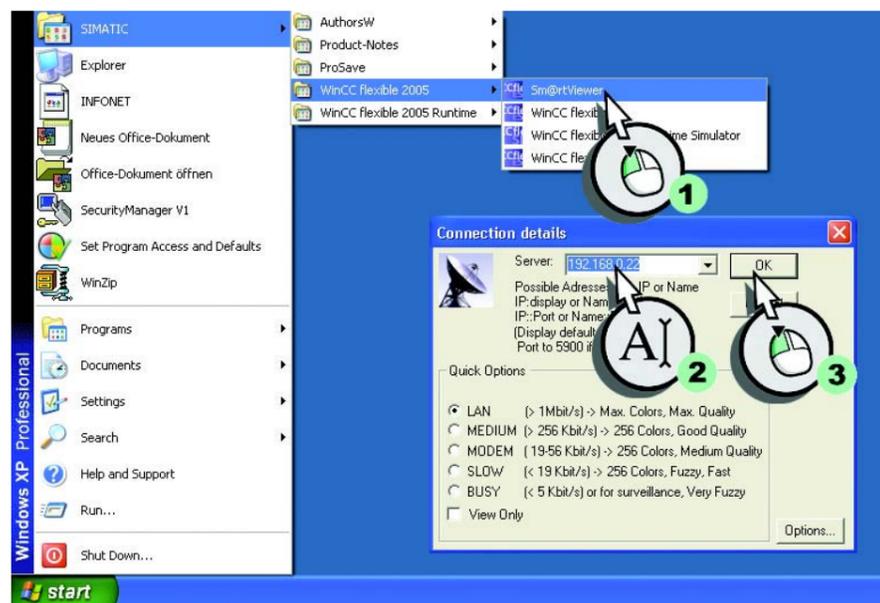
Unrestricted operation of a keyboard device is not possible in Internet Explorer, because only the screen contents are shown. We are going to use Sm@rtClient to enable remote control of the HMI keys by the field service technician.

4.4 Configuring remote control of a keyboard device

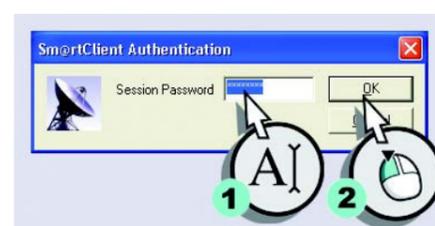
The OP 270 6" HMI only has one keyboard configuration, i.e. the service technician needs a separate program to simulate the keyboard operation.

The "SmartClient" application is available in the "Support\SmartClient" folder on the second WinCC flexible CD.

1. Run Sm@rtClient (1) on the engineering computer, and then log on to the HMI (2, 3):

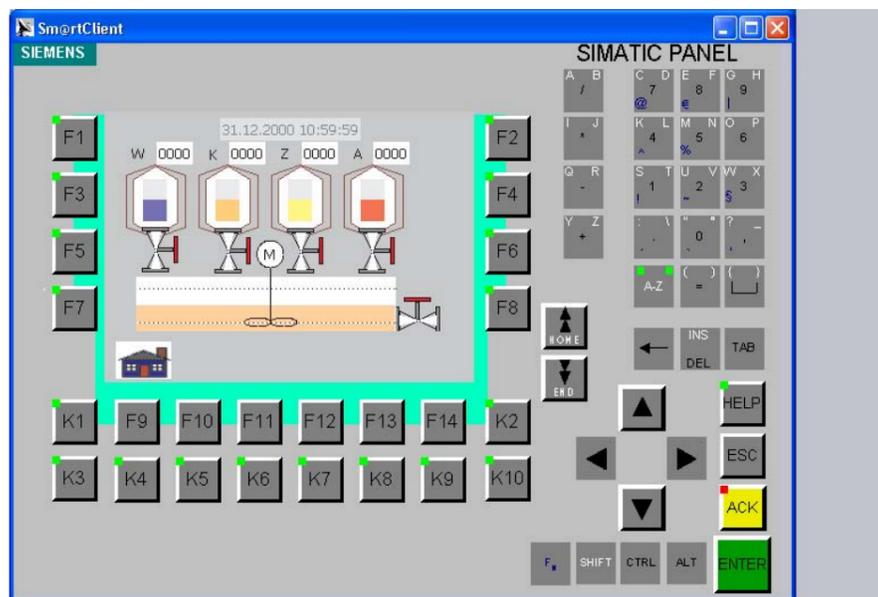


2. Enter the password "100" for remote control of the HMI device.



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Sm@rtClient now allows the field service technician to operate the HMI keys using a mouse:





The zip file "WebContents" with the source data for the Service-HTML pages of the HMI device, are in the WinCC flexible installation folder in the "Transfer\1.1\XP270" folder.

When using a PC as an HMI device, you can find the source files of the service pages in the WinCC flexible installation folder in the installation directory "WinCC flexible 2005 RuntimeWebContent".



4.5 Creating user-defined HTML service pages

The service technician is also able to see the filling levels over the Internet without a remote control. The service technician can use this possibility, if for example due to safety reasons, certain ports (e.g., Port 80) which are used by the Sm@rtServer, have been disabled by network administrators. Furthermore the plant operator also has the possibility to get information on the status of the fruit juice mixing system using the Internet Explorer.

For this reason, based on the home page a new service page "Plant State" is created. On this service page the service technician can read the values of the level tags and the mixer speed.

Below is the principle procedure on how to create ones own service page, which can be comprehended with the completed configured service page. You can find the service pages "WebContents" on the third WinCC flexible CD in the folder "Documents\[Language]\Getting Started". The content changes are commented in the HTML source code ("<!-- Getting Started: [...]-->").

Further information on the service page can be found in the "WinCC flexible Information System" under "Sm@rtAccess, Sm@rtService".

1. Copy the zip file "WebContents" in any working directory on your configuration computer and unzip the zip file here.

1. Make a copy of the file "start.html" and assign "PlantState.html" as a new file name.

2. Open the file "PlantState.html" in any text editor, for example Notepad.

- Extend the left navigation bar with the "Plant State" entry:

```
<!-- Getting Started: Added active page in navigation bar -->
<!-- Getting Started: START Active page -->
<tr><td colspan="3" height="20"></td></tr>
<tr>
  <td width="8" height="19"></td>
  <td width="7" height="19">
    </td>
  <td width="101" class="ad_nav_link_selected" height="19">
    <font color="#FFFFFF">Plant State</font></td>
  </tr>
<!-- Getting Started: END Active page -->
```



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- Replace the existing table with a new table, in which the filling levels and the mixer speed are displayed:

```
<!-- Getting started: New table with fill levels and mixer speed -->
<table border="1" class="sph_table" cellspacing="0" width="600">
  <tr><th class="sph_th"><b>Fill levels and mixer speed. Press &lt;t;F5&gt; to update
values</b></th></tr>
  <tr><td class="sph_td"><b>water fill level</b></td><td class="sph_td">
  <MWSL><!-- write(GetVar("FillLevel_water")); --></MWSL>&nbsp;</td></tr>
  <tr><td class="sph_td"><b>Concentrate fill level</b></td><td class="sph_td">
  <MWSL><!-- write(GetVar("FillLevel_concentrate")); --></MWSL>&nbsp;</td></tr>
  <tr><td class="sph_td"><b>Sugar fill level</b></td><td class="sph_td">
  <MWSL><!-- write(GetVar("FillLevel_Sugar")); --></MWSL>&nbsp;</td></tr>
  <tr><td class="sph_td"><b>Aroma fill level</b></td><td class="sph_td">
  <MWSL><!-- write(GetVar("FillLevel_Aroma")); --></MWSL>&nbsp;</td></tr>
  <tr><td class="sph_td"><b>Mixer speed (RPM)</b></td><td class="sph_td">
  <MWSL><!-- write(GetVar("Mixer_speed")); --></MWSL>&nbsp;</td></tr>
</table><br>
</p>
</td>
</tr>
</table>
```



The result then looks like this:

Fill levels and mixer speed. Press <F5> to update values	
Water fill level	546
Concentrate fill level	286
Sugar fill level	769
Aroma fill level	780
Mixer speed (RPM)	768

3. Adapt the interface texts:

The screenshot shows a Microsoft Internet Explorer browser window titled "Miniweb Start Page - Microsoft Internet Explorer". The address bar displays "http://192.168.0.22/PlantState.html". The page content includes the Siemens logo and the title "SIMATIC HMI Miniweb on MixingStation". Below the title, there is a login section with "Name" and "Password" input fields and a "Login" button. A navigation menu on the left lists: "Start page", "Remote Control", "Control Functions", "System Diagnostics", "File Browser", and "Plant State". The main content area displays "Plant state of mixing station" with a timestamp "last update 08:47:43 10.02.2006". Below this, it says "Plant State of MixingStation" and "The runtime is running". A table titled "Fill levels and mixer speed. Press <F5> to update values" contains the following data:

Fill levels and mixer speed. Press <F5> to update values	
Water fill level	546
Concentrate fill level	286
Sugar fill level	769
Aroma fill level	780
Mixer speed (RPM)	768

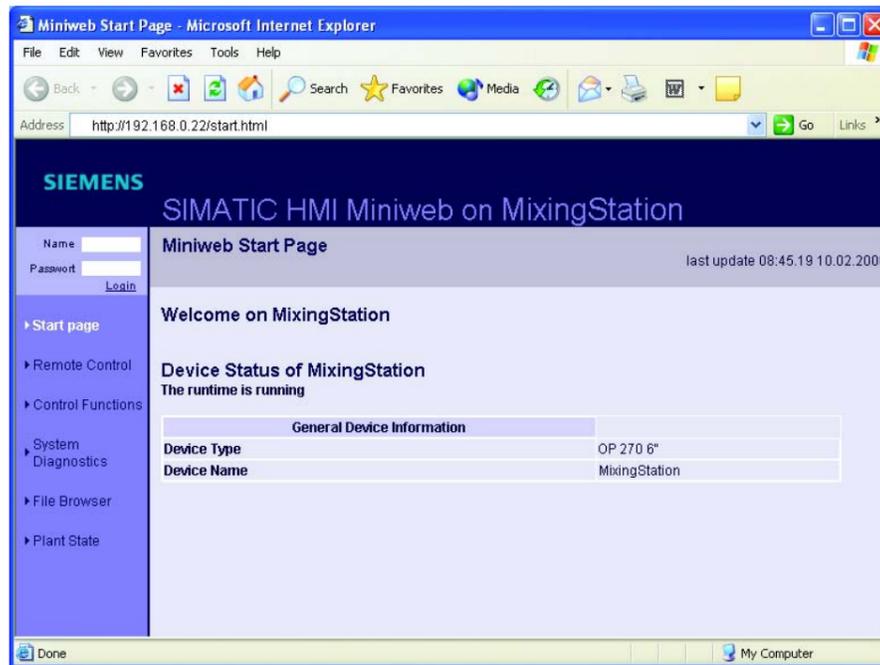
4. Save and close the "PlantState.html" file.

5. Open the file "start.html" and insert a hyperlink on the page "Plant-State.html":

```
<!-- Getting Started: According to the Getting Started,
a link to the service page "Plantstate" is added -->
<!-- Getting Started: If you want to insert this link in the other service pages,
copy the following link section -->
<!-- Getting Started LINK START -->
<tr>
<td width="8"></td>
<td width="7">
</td>
<td width="101" class="ad_nav_link">
<a href="/PlantState.html" class="ad_nav_link">Plant state</a></td>
</tr>
<tr><td colspan="3" height="20"></td></tr>
<!-- Getting Started LINK END -->
```



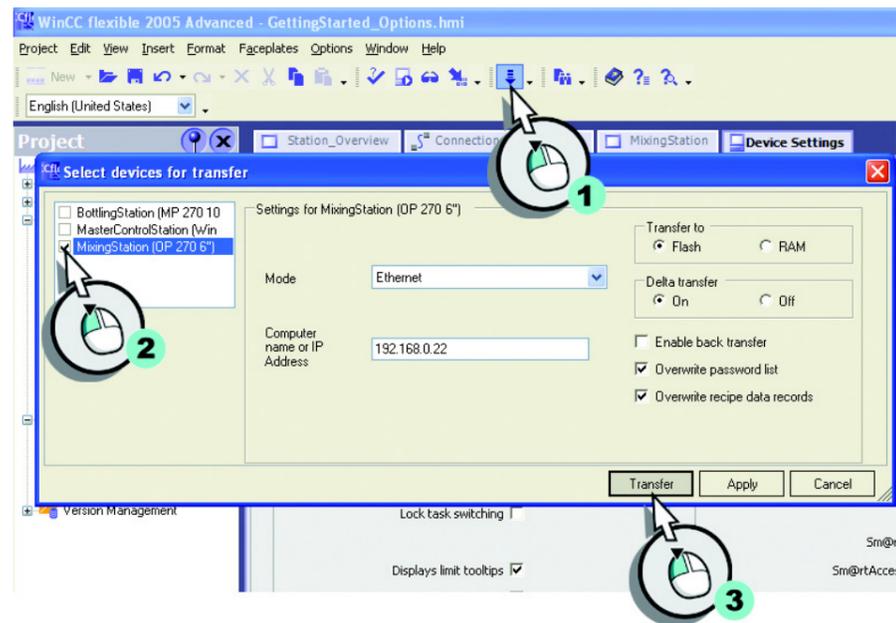
The result then looks like this:



6. Reinsert the changed files into the zip file "WebContents" and copy the zip file back into the directory "XP270".

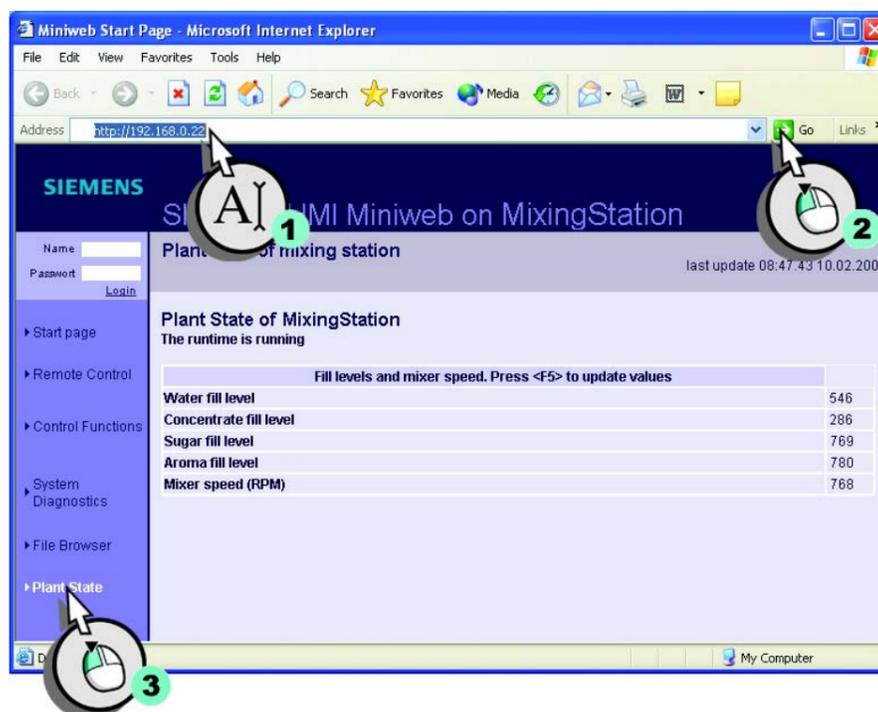
WinCC flexible Getting Started Options
Getting Started, Edition 04/2006, 6ZB5370-1CN02-0BA2

7. Transfer the project to the "MixingStation" HMI device:

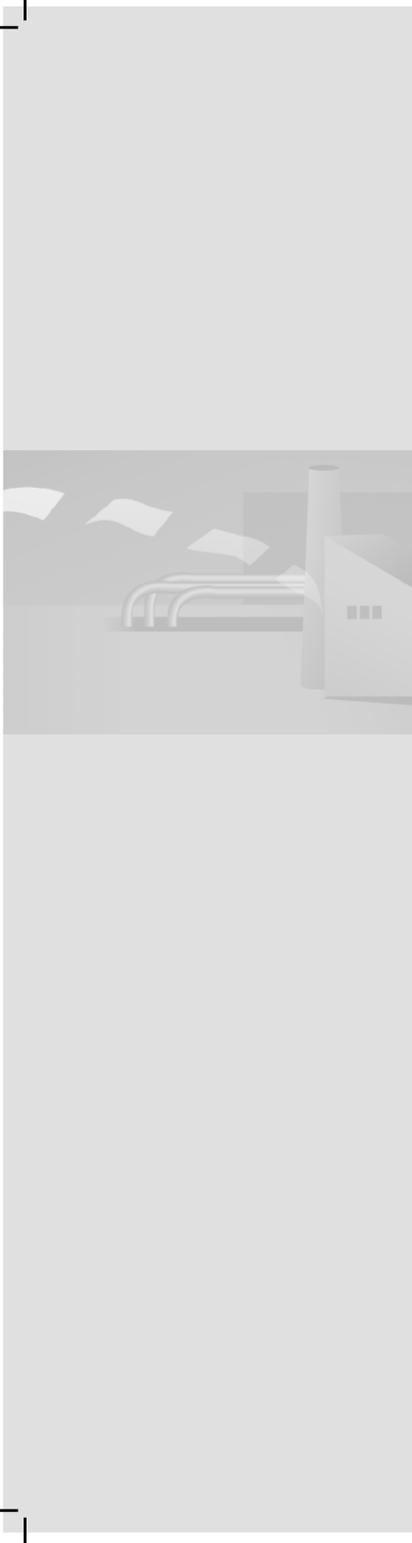


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8. Run Internet Explorer on the programming device, then log on to the HMI “homepage” (“http://192.168.0.22”) and change to the “PlantState” page:

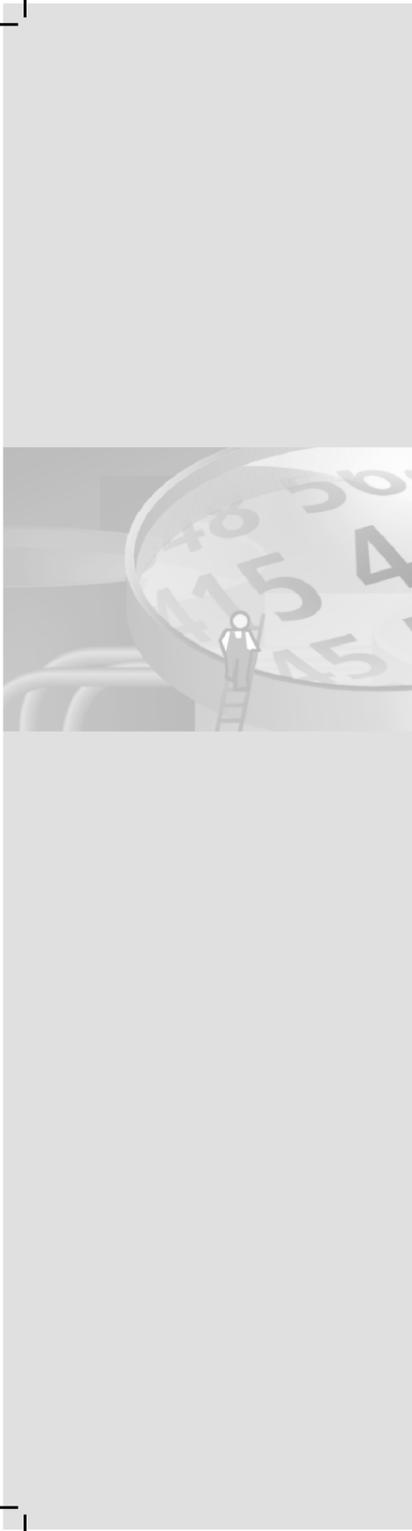


The current filling levels and mixer speed are displayed in the Internet Explorer. If you press “Update” in the Internet Explorer, the page will be reloaded and the values updated.



5 Production data acquisition by means of OPC





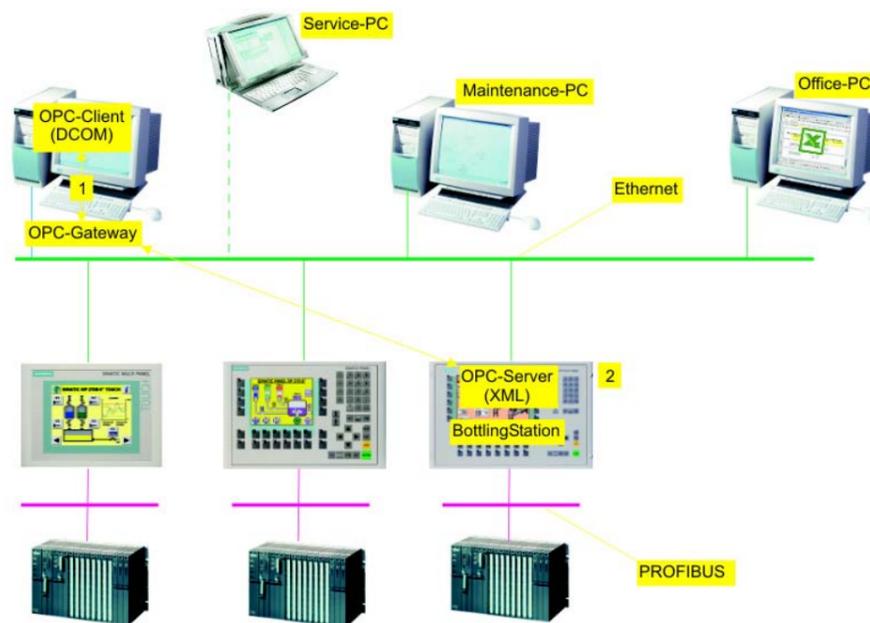
5.1 What is OPC?

OPC (OLE for Process Control) is a uniform, multi-vendor software interface. It can be used by various devices and applications to exchange data.

Many applications such as ODA or MES now operate with an OPC interface. Hence, we can easily integrate the MP 270B 10" HMI into the existing infrastructure.

In our example, that means that the operator would like to integrate the packaging system in his concept for production data acquisition. Production data acquisition has the purpose of logging the number of produced drink packages per hour for subsequent analysis.

5 Production data acquisition by means of OPC



To access the OPC server, you can also use an OPC XML DA client, rather than the OPC gateway.



In our example, applications such as ODA or MES communicate by means of DCOM (1), while the BottlingStation HMI device uses XML (2) for data exchange. In order for the production data acquisition program and the HMI device to “understand” each other, we need a “translator.” This translator, namely the “OPC Gateway,” ensures that all data are translated into the relevant “language” of the corresponding standard.

Requirements

To carry out the relevant programming steps, you need an OPC client PC and an Ethernet connection to the MP 270B 10" HMI device. The OPC gateway is installed on the PC.

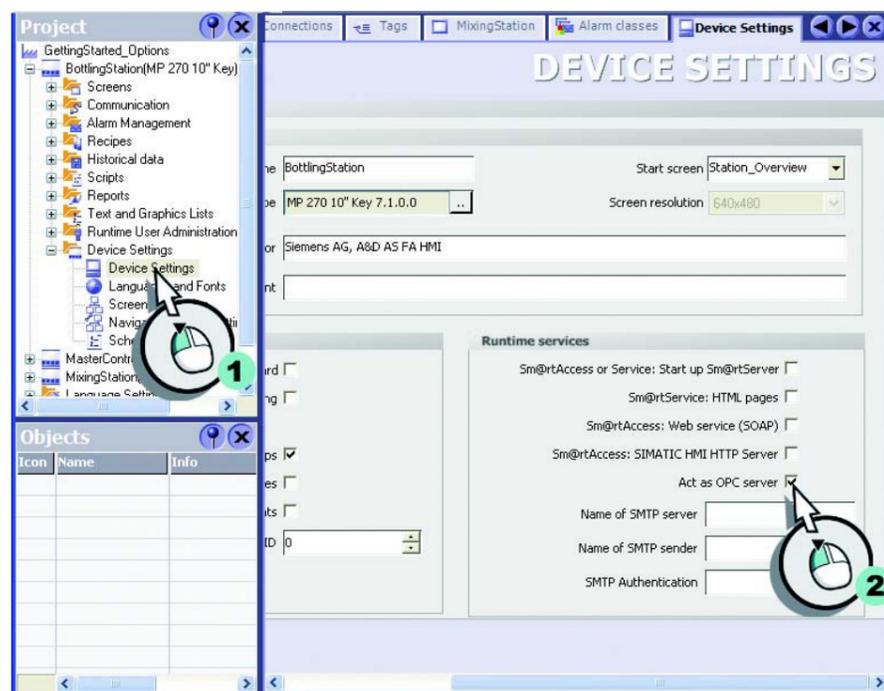
The setup of the “OPC-Gateway” (SIMATIC OPC XML Wrapper) is in the “WinCC flexible\Setup\OPCXMLWrapper\Disk1” folder on the second WinCC flexible CD and on the Runtime CD.

5.2 Configuring the “BottlingStation” as an OPC server

Because the sales department requires quarterly information with respect to bottling system performance, we shall configure the “BottlingStation” (MP 270B 10”) HMI of the packaging system as an OPC server.

In our example, we shall use MS Excel as OPC client to output process values, rather than the ODA application.

1. Configure the “BottlingStation” HMI as an OPC server:



5 Production data acquisition by means of OPC

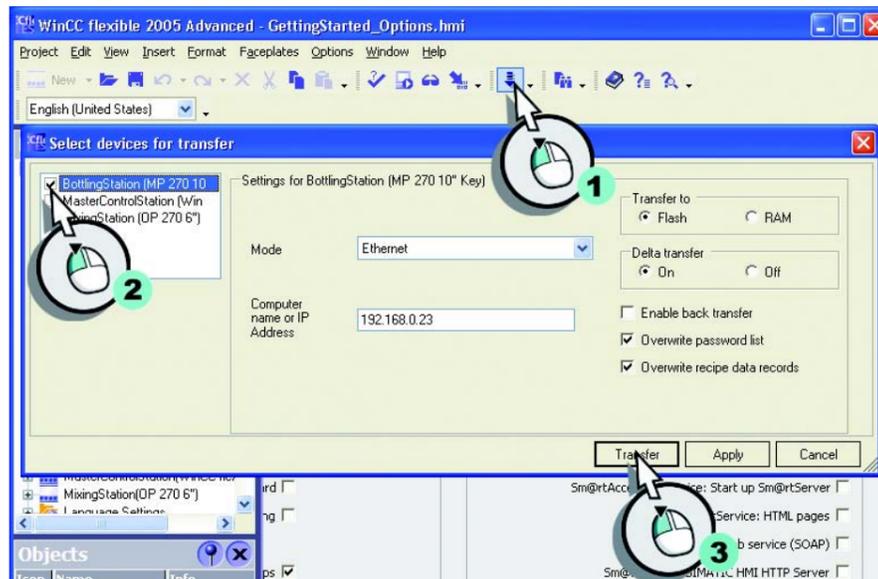
A change of the IP address is accepted only after a restart of the HMI.



2. Confirm the following ControlPanel settings for the MP 270B 10" HMI device:

- The IP address is 192.168.0.23.
- The subnet mask is 255.255.255.0.
- Data transfer mode is set to Ethernet.

3. Transfer the "GettingStarted_Options" project to the "BottlingStation" HMI:

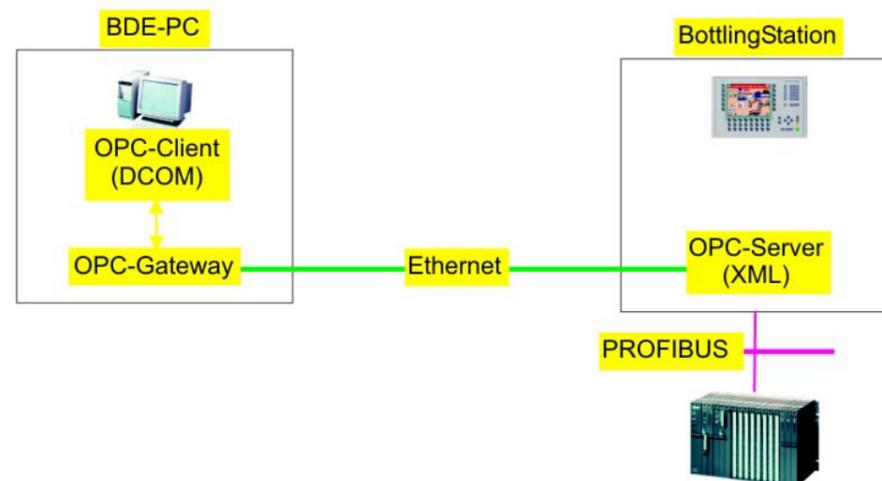


5.3 Configuring the engineering station as OPC client

We shall use MS Excel as OPC client on the programming device to simulate the ODA PC which is connected by means of OPC. This OPC client represents a basic implementation, and is therefore not suitable for plant operation.

The Excel file "OPC_Client.xls" is stored in the self-extracting file Project_GettingStarted_Options_WinCC_flexible_2005.exe.

The engineering station communicates via DCOM by default, whereas the "BottlingStation" HMI uses XML to exchange data. The engineering station can access HMI data by means of OPC Gateway:



1. Verify that the following conditions are satisfied:

- Microsoft SOAP Toolkit V3.0 is installed on the engineering station (ODA PC.)
You can download Microsoft SOAP Toolkit from the Internet at "<http://msdn.microsoft.com/webservices>." Earlier versions of Microsoft SOAP Toolkit will not be overwritten and can be used in parallel.

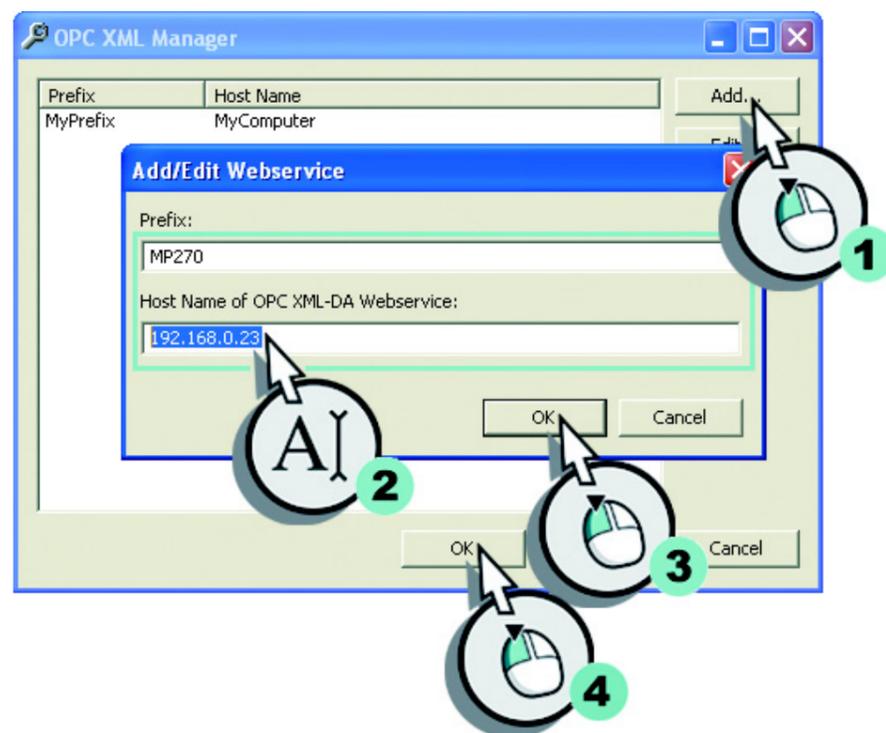
5 Production data acquisition by means of OPC

You can find the XML-Manager under "Start > SIMATIC > WinCC flexible 2005 Runtime".

XML Manager also supports the configuration of network connections to several OPCXML servers.



2. On the engineering station, open XML Manager. Configure the OPC gateway by entering the address of the OPC server (MP 270B 10):



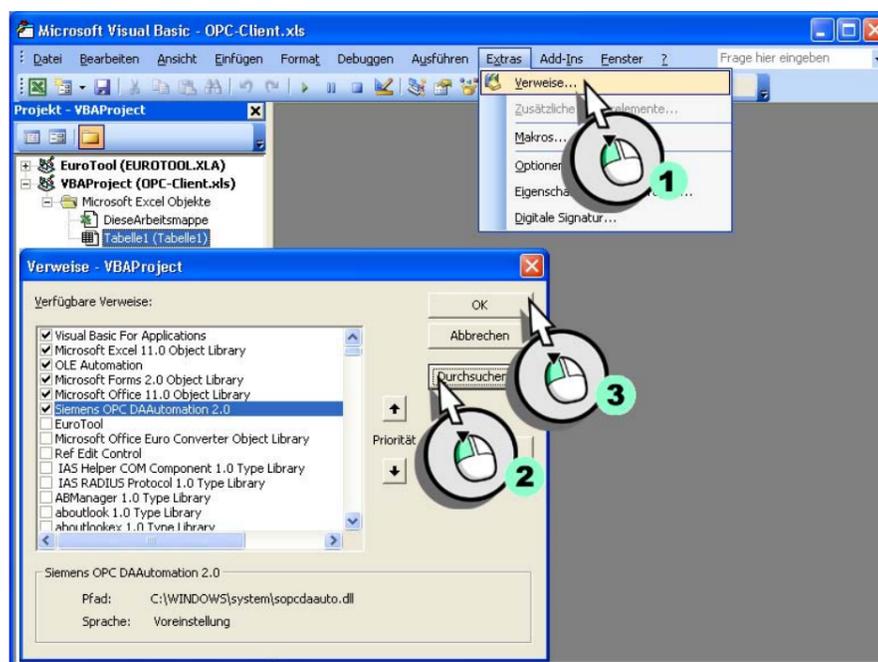
3. Launch MS Excel on the configuration computer and open the "OPC_Client.xls" file:

4. Press <ALT+F11> to open the VBA editor.

The default folder for the class library is "C:\Program Files\Common Files\OPC."
If ProTool is also installed on your engineering station, the class library is found under "C:\Siemens\Common\OPC."



5. Verify that the Siemens OPC DAAutomation 2.0 (sopcdauto.dll) class library is registered and referenced in MS Excel:



5 Production data acquisition by means of OPC



To show further tag values, enter the relevant tag names with the prefix "Prefix:Win CC flexible RT<@>" at cells A14 to A18.



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6. Close the VBA editor, and log on to the bottling station HMI device:

Server Name	Node Na	Group Name	Status	Update-Time	Item-Count	ServerS
OPC.Siemens.XML		MyGroup	Client off	18.06.2004 13:4	1	

Tags (Items)	Current Value
MP270:WinCC flexible RT<@>Packaged_Bottles	100

Using the file macro, the sales manager can view selected process values in real time on his computer, and save those for further processing.

7. Close the OPC client by clicking "Stop Client".