

# HNS SPC

Statistical process and quality control

## Sampling control



## **Sampling control**

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## 1 Description of the function

The aim of the *sampling control* function is to ensure - regular and special - sampling in allotted time periods, or rather in case of missing a sampling the appropriate persons in charge should automatically be notified.

### 1.1 Operation of the monitoring function

In case the monitoring function is activated, the software checks the appointed processes at the predefined frequency whether defined samplings have been done, will send an e-mail if a defined sampling has not done, then schedules following sampling.

Similarly to the DataConnection, the software assures the monitoring and alerting function as in-built services. In order for the function to be available and to operate in a given SPC system, it is necessary to have at least one - running - software where this function - service - is enabled.

#### **Attention!**

*In case the service is not enabled in either program in a given SPC system, then monitoring is suspended and the possible e-mails will not be sent either.*

By enabling the service again after turning off it, program checks in reference to appointed processes if defined samplings have been done, and send e-mails about missing samplings. In case of sampling by time user will be notified about every missed sampling, but in case of sampling by events an e-mail will be sent only about last missing sampling - by reason of technical possibilities.

#### *Note*

*If the monitoring function is disabled, the status of the last (before turning off) scheduled sampling can be seen in the status matrix, but the program cannot schedule the following sampling, excepting the sampling related to manual events.*

As the service is to be operated continuously - even 24 hours a day, depending on the number of shifts - it is useful to designate - at least - one computer in the system where the software assuring the service will be running constantly.

#### *Note*

*The monitoring function works for the factory actually specified in the given program.*

#### *Note*

*By normal using of the program (if access levels are used suitably) operator can input data only in the defined measuring programs, and every data input are prescribed in the measuring program have to be done. So if a measuring program contains sampling for more processes and a process occurs in one measuring program, it is enough to appoint one process for sampling monitoring in a measuring program, because in this way is ensured, that sampling will be done also for every processes in the measuring program.*

## 2 Settings

### 2.1 Selecting monitored processes and sampling frequency settings

The processes can be appointed for sampling control and the sampling frequency can be set or changed when a process is created or when process settings are modified.

1. in the **Measured process / Attributed process** menu item of the **Database** menu by creating a measured / attributed process,
2. in the **Process settings - Change** menu item of the **Database** menu, by modifying the process settings.

#### 2.1.1 By measured processes

In the **Process Settings** window can be found the **Sampling control enabled** switch by enabling which and in the window opening when the **Control settings >>** button is pressed, can be specified the sampling frequency settings related to the given process.

The function is not used in case of machine capability study, so the **Sampling control enabled** switch is not active in this case.

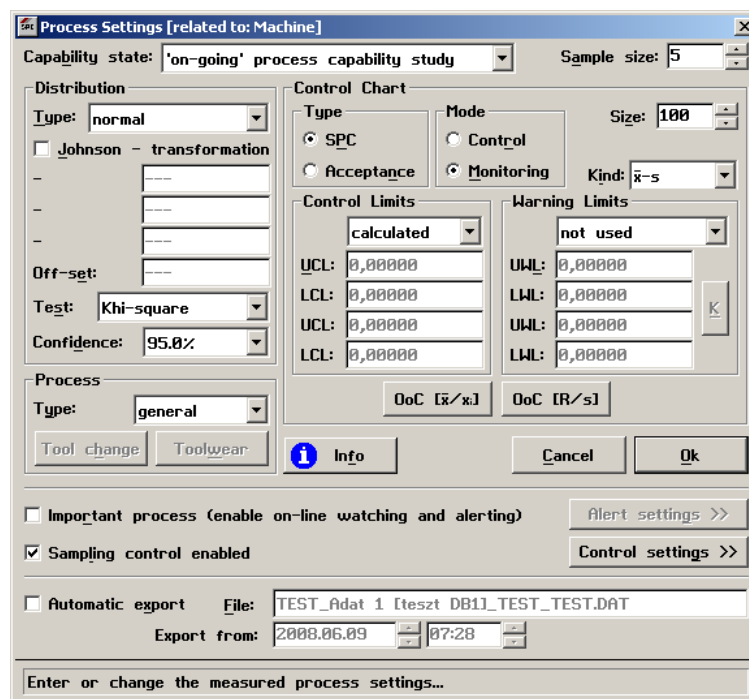


Figure 1: Appointing a process for sampling control in the Process Settings window

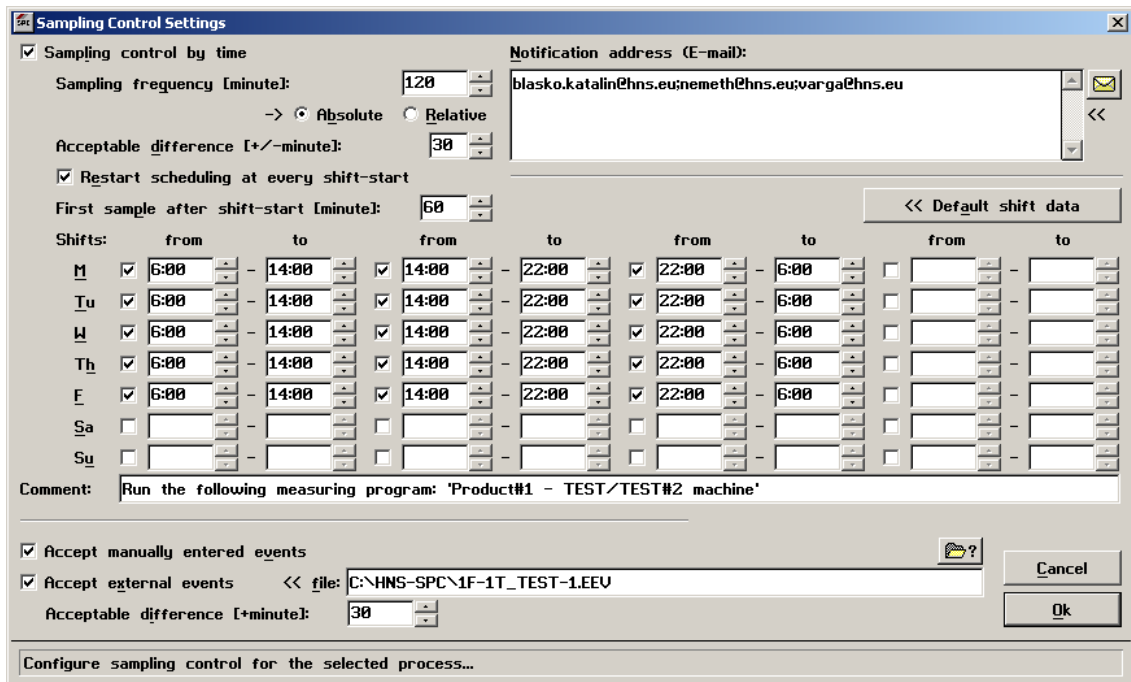



Figure 2: Sampling frequency settings

The users (e-mail addresses) to whom e-mails related to the given process have to be sent, have to be provided in the **Notification address (E-mail)** field in the **Sampling Control Settings** window.

If you have defined the users and provided their e-mail address in the **Password** menu item of the **Settings** menu, then you can choose the e-mail addresses of the persons from the list of users, with the help of the  button. In the list of users, more than one person can also be selected at a time. The software automatically locates the e-mail addresses of the persons selected from the list after the addresses possibly already provided. When selecting from the list, the program also controls that one address should be featured only once in the given list.

#### Note

An additional advantage of creating a user list, that in case of change (modifying an e-mail address, deleting a user) here, it will be modified in all sampling control e-mail lists automatically. Furthermore it is possible to delete a user all the sampling control e-mail lists by means of **<@>Remove** button at the user list. See also the **Personal >>** sheet in the **Password** menu item of the **Settings** menu.

The e-mail addresses can also be entered through the keyboard. By giving more e-mail addresses the individual addresses have to be entered in the usual way: one after the other, separated by a semicolon.

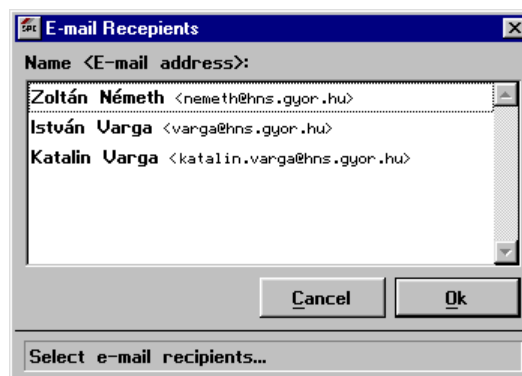


Figure 3: Selecting e-mail addresses


**Attention!**

In order for the software to be able to send e-mails, the settings necessary for e-mail sending have to be provided in the **E-mail** menu item of the **Settings** menu. Without providing the settings related to mailing or in the case of faulty settings, the software cannot send e-mails. The software records the errors of e-mail sending into the sampling control log as 'E-mail error' entry.

Sampling can be done by time (with defined frequency) or by occurrence an event. This event can be entered manually or detected automatically. These three possibilities can use also simultaneously.

By switching on the **Sampling control by time** switch relevant information should be given for determining proposed sampling time. Firstly the **shifting** related to the process should be given. Shifting defined in the **Shift ID's** menu item of the **Settings** menu can be copied by means of **<< Default shift data** button. Further necessary settings are as follows:

- **sampling frequency [minute]** that is the elapsed time between two sequential sampling,
- **acceptable difference [+/- minute]** that is the time period compared to proposed sampling time, within the sampling is acceptable, this value can be smaller, than the sampling frequency, and can be maximum 60 minutes,
- in case of **absolute** method the next sampling time is calculated by proposed (nominal) time of previous sampling, but in case of **relative** method by actual time (the time period between two sequential sampling - spend in shifts - is constant),
- **restart scheduling at every shift-start** switch means, that program calculates sampling time according to shift start in every shift, without reference to the last sampling time in previous shift,
- **first sample after shift-start [minute]** that is the time compared to shift start when first sample should be get, this value can be maximum 120 minutes. This field is active only if **restart scheduling at every shift-start** switch is on.

In case of switching on the **accept manually entered events** or the **accept external events** switch a sampling is required by occurrence of certain events. An event requires a prompt sampling (within allowed time period). Two possibilities differ from each other in the way of detecting the events. In first case an event should be input by the user manually (selecting from a pre-defined list), but in second case an external device makes a notice in a certain file. The file name and path should be given in the **file** field, or the file can be search by  button. See also the chapter about *Sampling events*.

In **acceptable difference [+ minute]** field should be given that how many minutes is allowed to elapse from occurrence of an events till the sampling.

The text in the **comment** field will be displayed in the status matrix row related to given process - in case of sampling by time and by events, too. This comment can denote for example to the measuring program, which contains the data input related to the given process.

Sampling control related to a process can be switched on and off at any time and also sampling frequency can be changed in **Measured process - Change** menu item in the **Database** menu.

See also the chapter *Sampling time calculation*.

**Attention!**

**If sampling control settings are changed related to a process, program schedules following sampling time again according to shift-start (as if sampling control function would be started at that time related to given process).**

### 2.1.2 By attributed process

In the **Process settings** window can be found the **Sampling control enabled** switch by enabling which and in the window opening when the **Control settings >>** button is pressed, can be specified the sampling frequency settings related to the given process.

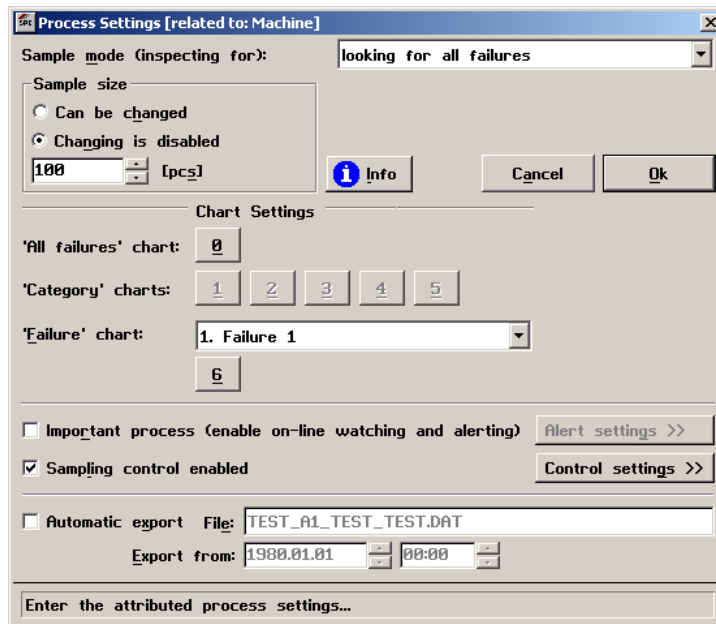


Figure 4: Appointing a process for sampling control in the Process Settings window

Sampling frequency settings are the same as by measured process, see in previous chapter.

## 2.2 Sampling control settings

### 2.2.1 Sampling control settings

In order for the appointed processes to be checked automatically and for the possible e-mails to be sent, it is not enough to appoint the processes and to provide the sampling frequency settings. The sampling control function has to be enabled separately with the **Automatic sampling control enabled** button in the **Sampling control - Service** menu item of the **Settings** menu. Moreover, the necessary parameters have to be set as well.

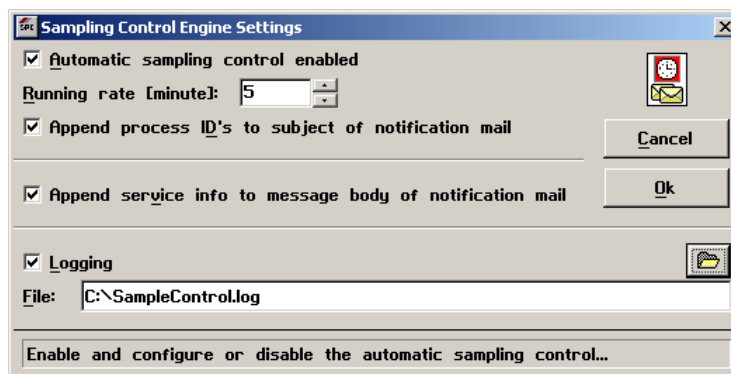


Figure 5: Sampling control settings

The service status is shown by the sign in the bottom right corner of the main window:

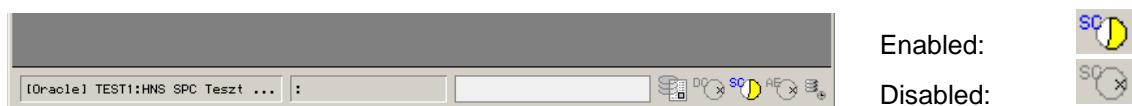


Figure 6: Status of the sampling control function

The parameters to be set are the following:

#### **Running rate [minute]**

Program monitors with given time frequency, whether scheduled sampling has been done in the specified time interval, and sends e-mails about missing sampling, then schedules following sampling times.

The more value is set in this field is smaller - the monitoring frequency is increased -, the more scheduling of sampling and sending e-mails will be timely. However when the value is specified, it has to be taken into account that the software carries out database queries at the intervals provided at the running rate, thus makes small-volume but regular database and network traffic at the given frequency.

**Attention!**

*If in a given system, the sampling control function is enabled in several programs, then it is useful to set different running rate on the individual machines (10 minutes on the first machine, 20 minutes on the second machine, etc.) because in this case, the further individual machines will actually join the checking only if it is actually necessary.*

*The checking will start automatically at the intervals appropriate to the settings, independently of which function of the software you are using. The software making checking will be occupied during the evaluation time and the software will suspend activity under process. After finishing the checking, the activity suspended at the start can be continued; from this aspect, the function is fully identical to the DataConnection function. Based on the above, it is also useful to enable monitoring at a machine or machines where the other load is low.*

**Append process ID's to subject of notification mail**

If the switch is on, the ID's [factory, workgroup, machine, head, position, product, parameter] of the process to which the given e-mail is related will be featured in the e-mail subject field.

**Append service info to message body of notification mail**

If necessary, the software can attach the service info belonging to the given e-mail - the physical sending time of the mail from the software and the physical ID used in the database - to the end of the message body of the notification mail.

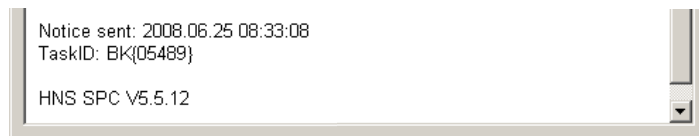




Figure 7: Service info in notification mail's message body

**Logging**

It is possible to log the events related to sampling control function. In order to enable logging, you have to turn on the **Logging** switch and have to specify a file (and path) where the software will locate the log entries. This file can be searched also with  button.

The software checks the monitored processes according to the above settings at regular intervals but the checking can also be started out-of-turn by clicking the  icon with the left mouse button. This icon can be found in the bottom right corner of the main windows and in the status row of the software's starter window as well but as the function can be directly accessed by users having engineer-level authorisation, out-of-turn processing can only be started after third-level login, from the engineer-level main window.

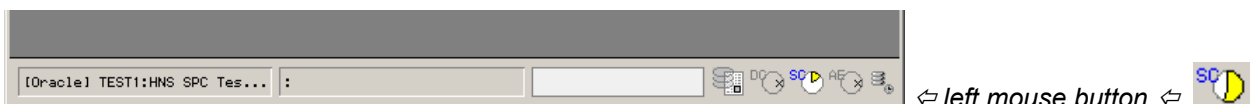


Figure 8: Prompt checking of monitored processes

The window appearing on screen indicates the checking under process.

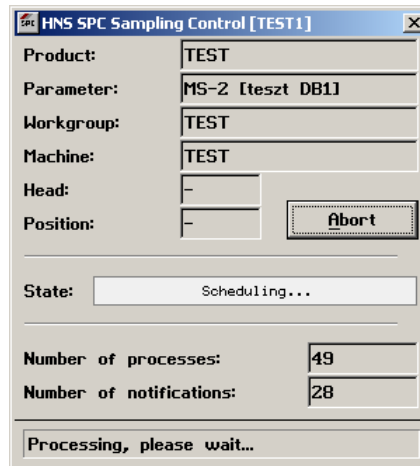


Figure 9: Sampling control is under process

Processing under process - checking the sampling, sending e-mails, and scheduling following sampling - can be aborted by pressing the **Abort** button found in the status window.

**Attention!**

Aborting becomes valid only after the check under process is finished.

## 2.2.2 Checking the sampling control function

The software assures a possibility to continuously monitor whether the sampling control function is enabled at any of the workstations (programs). This function can be enabled by turning on the **Enable checking of running of Sampling Control Engine(s)** switch in the **Sampling control – Checking service** menu item of the **Settings** menu.

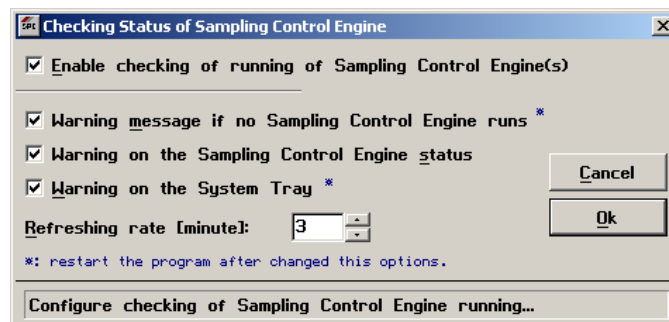


Figure 10: Checking Status of Sampling Control Engine

After checking, if the sampling control function does not work, the software might give some warning signal – depending on the settings specified by the user according to the following possibilities:

**Warning message if no Sampling Control Engine runs\***

When logging in to the software, a window appears and warns of the lack of any sampling control service running.

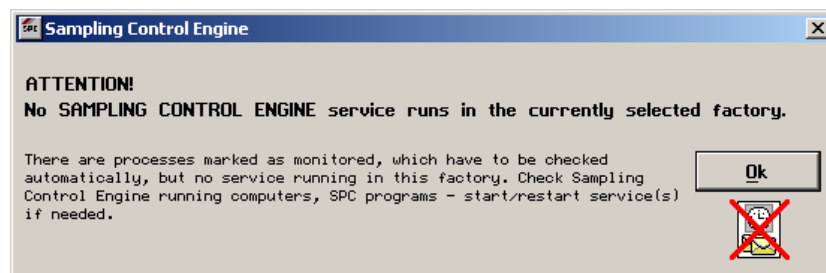




Figure 11: Warning message on the lack of sampling control engine running

**Warning on the Sampling Control Engine status**

In case the sampling control service is not running, the icon signalling the status of sampling control flashes in red (). (The icon can be found in the bottom right corner of the main windows and in the status row of the software's login window as well.)

**Warning on the System Tray \***

In case the sampling control service is not running, a warning icon () appears in the bottom right corner of the screen.

**Attention!**

*In order to enforce the changes set with the options marked with a \*, the program has to be restarted.*

**Refreshing rate [minute]**

The checking frequency of the running of the sampling control service. Its value can be set between 1 and 60 minutes. Each change is enforced at the latest after the period set for the refreshing rate has elapsed.

It is possible to enable the checking function only if at least one of the three warning options has been selected (i.e. the refreshing rate field and the OK button will not be active until at least one of the switches have not been switched on).

**Note**

*If there are no processes specified for sampling control in the actual factory, then the checking / warning functions can be enabled but no warning signals will appear.*

### 3 Sampling events

The program requires a special sampling in case of occurrence of an event. These events can be input into the program in two ways:

- manually, entered by a user (practically by the operator or by the repairer) in the program,
- automatically, with an file registry generated by an external program (for example by the controller of the production machine) and read in by HNS SPC program.

*Note*

*In case of sampling by manual events have to be taken into account that reliability of the monitoring is smaller, because the user is supposed to record the events.*

*Real control can be made with sampling by automatic events, but external program have to be prepared for generating of specified file.*

**Attention!**

*Manual and automatic events will not be stored in any format, they will be deleted by the program after scheduling of the sampling time.*

### 3.1 Manual sampling events

#### 3.1.1 Defining sampling events

Possible sampling events have to be pre-defined (in an event list), in order that the user who inputs the event does not have to give the processes that needs prompt sampling by occurrence of this event. User will choose an item from this list by input an event and program will schedule prompt samplings for the processes selected to the given event.

Sampling events are in a common list (for a given factory), so user has to select processes, whereby a prompt sampling is necessary in case of occurrence of this event.

List of sampling events can be defined in the **Sampling events** menu item of the **Database** menu.

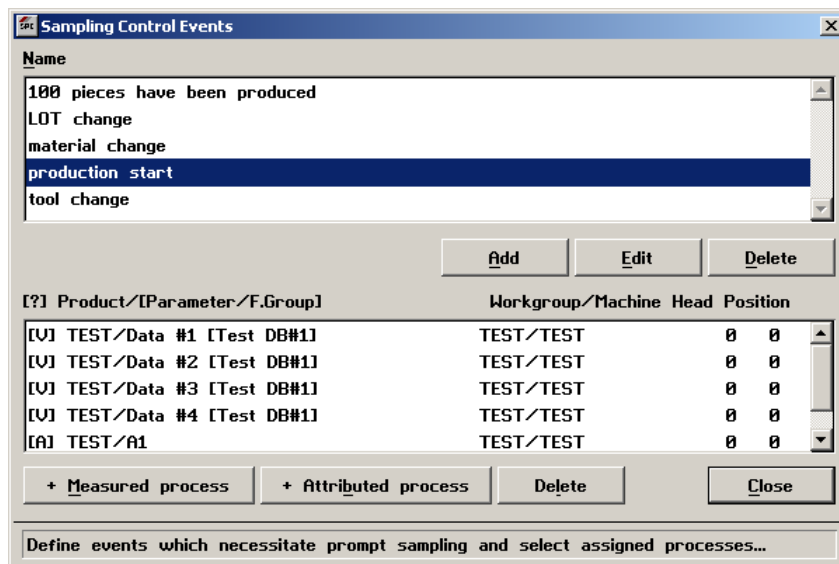


Figure 12: Sampling events

In the **Sampling Control Events** window is displayed the **name** of the sampling events and processes, selected to the given event.

A new event can be made with the **Add** button, and then the name of the event should be given in the next window. The name should be given in two languages - as anywhere in the HNS SPC database. If second row is left empty, program will write in the content of the first row automatically.

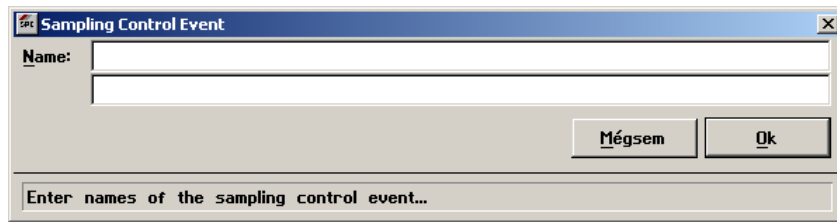


Figure 13: Name of the sampling event

After creating a new event should be selected the processes, whereby a prompt sampling is necessary in case of occurrence of this event. Firstly you should appoint the name of the event and than select the processes with **+ Measured process** and **+ Attributed process** buttons in the **Select Process** window, severally one after the other. A selected process can be deleted with **Delete** button (can be found at the bottom of the window).

Name of the event can be modified, and an event can be deleted - with selected process together.

The window can be closed with the **Exit** button.

### 3.1.2 Enter an event

Input an event can be done in the **Sampling control – Event ->** menu item of the **Data** menu. See also the chapter *Functions for the operator access level*.

An event should be chosen from the event list in the displayed **Sampling Control Event** window. Date and time of the entering of the event is taken automatically by the computer's time, this cannot be modified. User ID is taken automatically by the ID was given at the log in, but this can be modified (for example operator who makes the data inputs was logged in, but the event is made and also recorded by a repairer).

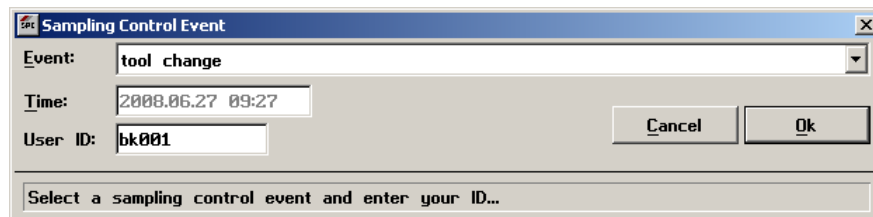


Figure 14: Enter a sampling event

## 3.2 Automatic (external) events

Requirements related to the file defined in the sampling control settings are as follows.

Extension of the filename: *EEV*

Content of a file entry as follows:

*date and time* in yyyy.mm.dd hh:mm format, where hh: 00-23  
*name of the event*, maximum 64 character  
*end of the row (crLf)*

For example:

```
2008.02.29 07:15 production start<crLf>
2008.02.29 07:32 100 pieces have been produced<crLf>
2008.02.29 10:01 lot change<crLf>
```

or

*name of the event*, maximum 64 character  
*end of the row (crLf)*

If a file does not contain a date, the program will use the date of the creating / last modifying of the file as the date of the given event.

***Attention!***

*If the same evv file is given for more processes, program will schedule this only for one process as a proposed sampling, because program will delete the file after scheduling it for the first process.*

## 4 The e-mail

### 4.1 Subject field

The subject field of the e-mail is as default: *HNS SPC Notice – Missed sampling*

In case the **Append process ID's to subject of notification mail** option is enabled in the **Sampling control - Service** menu item of the **Settings** menu, the subject field contains the following:

*HNS SPC Notice – Missed sampling [Factory, Workgroup, Machine,Head,Position, Product, Parameter]*

For example: *HNS SPC Notice – Missed sampling [TEST1, TEST, TEST,-,-, TEST, A1]*

### 4.2 Content of the e-mail

Content of the e-mail as follows:

*HNS SPC Sample Control Notice*

*ATTENTION, missed sampling!*

*Process: TEST1, TEST, TEST,-,-, TEST, A1  
Predicted sample date and time: 2008.06.03 13:04*

*Notice sent: 2008.06.03 13:34:49  
TaskID: BK{06162}*

*HNS SPC V5.5.12*

*HNS SPC Sample Control Notice*

*ATTENTION, missed sampling!*

*Process: TEST1, TEST, TEST,-,-, TEST, Data#3  
Predicted sample date and time: 2008.06.09 08:40*

*Event: LOT change  
User ID: bk*

*Notice sent: 2008.06.09 09:07:58  
TaskID: BK{16182}*

*HNS SPC V5.5.12*

*HNS SPC Sample Control Notice*

*ATTENTION, missed sampling!*

*Process: TEST1, TEST, TEST,-,-, TEST, Data#4  
Predicted sample date and time: 2008.06.09 06:00*

*Event: production start  
User ID: AUTO*

*Notice sent: 2008.06.09 06:30:12  
TaskID: BK{16182}*

*HNS SPC V5.5.12*

*HNS SPC Sample Control Notice*

*ATTENTION, missed sampling!*

*Process: TEST1, TEST, TEST#2,-,-, Product#1, Data#1*

*Predicted sample date and time: 2008.06.09 10:23*

*Comment: Run the measuring program 'Product#1 - TEST/TEST#2 machine'...*

*HNS SPC V5.5.12*


## 5 Log

It is possible to log the events related to sampling control function. The sampling control log can be enabled by turning on the **Logging** switch in the **Sampling control - Service** menu item of the **Settings** menu and by specifying the log name.

### Note

If the access route and name of the log file is not specified, then it will automatically be located in the program folder (the same folder where the SPC.EXE file itself is located), by name *SampleControl.log*.

### 5.1 Handling the log

The sampling control log can be opened easily by clicking on the  icon found in bottom right corner of the main screen on the third level, with the right mouse button.

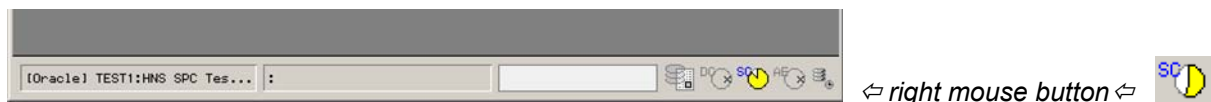


Figure 15: Displaying the log by clicking on the status sign

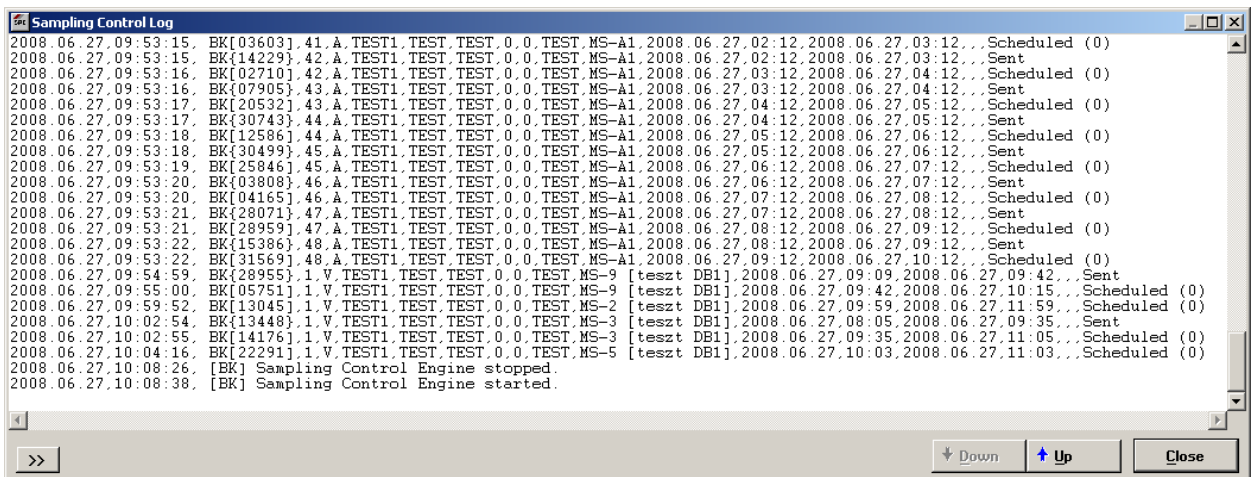
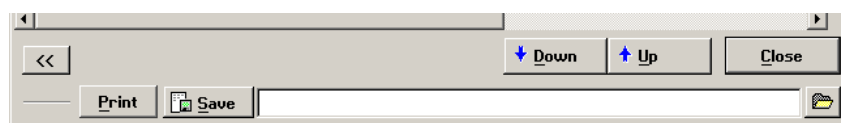


Figure 16: Displaying the log

With the help of the **Down** and **Up** buttons, you can change between the log pages (as the amount of text that can be displayed at a time is limited). By pressing the **>>** button, further functions can be accessed, with the help whereof the sampling control log can be printed (to the printer specified in the **Printer** menu item of the **File** menu) or it can be saved as a text file to a location you specify.



17. ábra: Mintavétel felügyelet naplójának nyomtatása és mentése

### Note

The sampling control log can also be viewed when the sampling control function or the logging are disabled. If the sampling control function is disabled, then it is indicated in the header of the log [turned off].

## 5.2 Contents of the log

Each time the software schedules next sampling time, sends an e-mail or any error comes about, an entry is made into the sampling control log.

The contents of the entries in order: *Date, Time, Task ID, Number, Measure/Attribute, Factory, Workgroup, Machine, Head, Position, Product, Parameter/Failure group, Previous date, Previous time, Predicted date, Predicted time, Operator, Event, Comment, Status.*

<i>Date, Time</i>	date and time of the log entry
<i>ID, Number</i>	service information
<i>Measure/Attribute</i>	'V' by measured process, 'A' by attributed process
<i>Factory, Workgroup, Machine, Head, Position, Product, Parameter/Failure group</i>	process identifiers
<i>Previous date, Previous time</i>	Reference time for scheduling of the following sampling time. This time is the real time of previous sampling in case of relative calculation, if previous sampling is made, otherwise (in case of absolute calculation or in case of relative calculation if previous sampling is missed) the proposed time of previous sampling. This time means the time of the appointing the process for monitoring or the time of the modifying the settings by scheduling the first sampling.
<i>Predicted date, Predicted time</i>	Date and time of following scheduled sampling. By an entry with the status 'Sent' the predicted date and time of missed sampling.
<i>Operator</i>	User ID of the operator who entered the event, or 'AUTO'.
<i>Event</i>	Name of the event in case of sampling by event.
<i>Comment</i>	Comment related to the given process.
<i>Status</i>	'Scheduled' = following sampling time is scheduled 'Sent' = an e-mail is sent about a missing sampling 'Obsolete (dropped)' = automatic event, found in the eev file is dropped

Examples:

```
2008.06.04,07:33:12, BK[10994],1,V,TEST1,TEST,TEST,0,0,TEST,
☛ TEST-6,2008.06.04,07:30,2008.06.04,08:30,,,Scheduled (0)
```

Program made a checking at 2008.06.04 07:33:12, whereby the following sampling date and time (2008.06.04 08:30) was scheduled related to the measured process 'TEST1,TEST,TEST,0,0,TEST,TEST-6' on the basis of the previous sampling date and time (2008.06.04 07:30).

Program scheduled the following sampling, because a sampling was done in the proposed time period, or was not done a sampling till the term of the sampling.

```
2008.06.04,08:53:54, BK{24701},19,V,TEST1,TEST,TEST,0,0,TEST,
☛ TEST-6, 2008.06.04,07:30,2008.06.04,08:30,,,Sent
```

Program detected by the checking at 2008.06.04 08:53:54, that last scheduled sampling was not done, so sent an e-mail.

```
2008.06.05,11:54:09, ---[----],1,V,TEST1,TEST,TEST,0,0,TEST,
☛ TEST-3,2008.06.05,11:49,2008.06.05,11:49,AUTO,LOT change,Scheduled (0)
```

At 2008.06.05 11:54:09 the program detected an event namely 'LOT change', which came an external file with the date and time 2008.06.05 11:49 related to the measured process 'TEST1,TEST,TEST,0,0,TEST,TEST-3', so the program scheduled a prompt sampling.

2008.06.06,15:51:22, BK{23889},1,V,TEST1,TEST,TEST,0,0,TEST,  
TEST-4,2008.06.06,15:48,2008.06.06,15:48,xy-01,material change,Sent

Program detected by the checking at 2008.06.06 15:51:22, that the last special sampling scheduled by the time 2008.06.06 15:48 by reason of a manually event, namely 'material change', entered by the user with ID 'xy-01', was not done, so sent an e-mail.

#### Note

*Scheduling a sampling because of a manually entered event is not displayed in the log file – by reason of technical possibilities.*

Besides the above events, the software also logs the HNS SPC program which assures sampling control started and stopped on the given machine, the overlap and the occurrence of the possible e-mail errors.

#### Examples

2008.05.23,09:20:55, [BK] Sample Control Engine started.

2008.05.23,12:27:25, [BK] Sample Control Engine stopped.

2008.05.20,07:23:36, [BK] Sampling Control Engine overlapped runs (previous batch is running).

2008.05.18,09:13:14, E-mail ERROR - BK[-501].

## 6 Status matrix

Status matrix contains and displays in a table the following samplings, related to monitored processes. Status matrix always contains data for the selected factory and it can be displayed at every access levels.

### 6.1 Accessing the status matrix

Status matrix can be found in the **Sampling control - Status** menu item of the **Data** menu - at 2<sup>nd</sup> and 3<sup>rd</sup> access levels. See also the chapter *Functions for the operator access level*.

### 6.2 Contents of the status matrix

Product/[Parameter/F.Group]	Workgroup/Machine/Head,Position	Sp	Sa	Predicted time	Term of sample
TEST/MS-1 [teszt DB1]	TEST/TEST/0,0	Red	Green	06.27 11:00	06.27 11:30
TEST/MS-2 [teszt DB1]	TEST/TEST/0,0	Green	Green	06.27 11:59	06.27 12:29
TEST/MS-3 [teszt DB1]	TEST/TEST/0,0	Red	Green	06.27 11:05	06.27 11:30
TEST/MS-4 [teszt DB1]	TEST/TEST/0,0	Grey	Yellow	06.27 10:02	06.27 10:32
TEST/MS-5 [teszt DB1]	TEST/TEST/0,0	Green	Green	06.27 11:03	06.27 11:13
TEST/MS-A1	TEST/TEST/0,0	Red	Yellow	06.27 10:12	06.27 10:32

Reason of sampling (event name):  
[bk001] tool change

Comment:  
Run the following measuring program: 'Product#4 - TEST/TEST#2 machine'

List of predicted sample times by processes...

Figure 18: Status matrix

Meaning of the numbers found in the header of the status matrix: *Number of scheduled samplings [related to measured parameters / related to failure groups]*

Meaning of the status matrix rows:

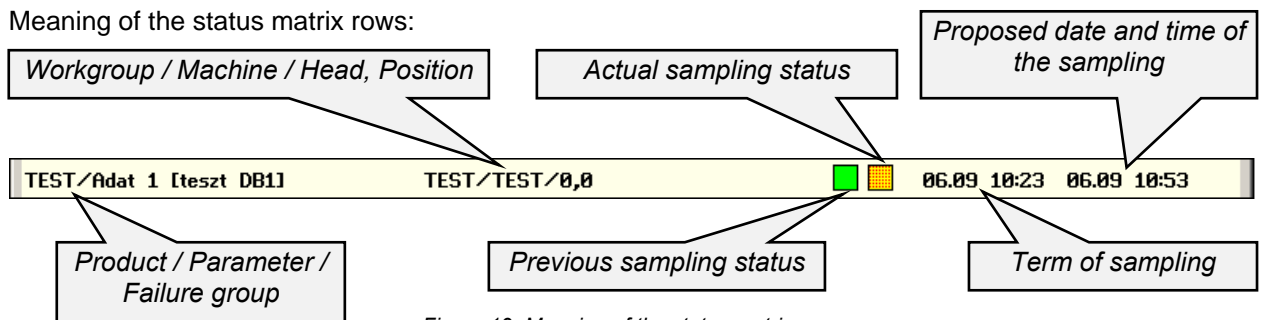





Figure 19: Meaning of the status matrix rows

At the bottom of the status matrix in the **reason of sampling** field can be found the user ID of the operator who entered the event, or an '[External]' comment, and the name of the event. In comment filed is displayed the text which was given by the sampling control settings related to the given process. The content of both fields applies to the selected status matrix row.

Meaning the colours of the sampling status:

Previous sampling status (Sp):

-  grey : there was not a previous sampling  
*first sampling after appointing a process for sampling control or after modifying the sampling control settings*  
*sampling by an event*
-  red : previous sampling was missed (was not done in proposed time period)
-  green : previous sampling was done in proposed time period

Actual sampling status (**Sa**):

- green : sampling is not actual
- yellow : sampling can be done (the time is after the earliest sampling time, but before the proposed sampling time, where the earliest sampling time = proposed sampling time - acceptable difference)  
*this status is not used for a sampling by event, because in this case is not possible an earlier sampling compared to proposed sampling time)*
- orange : sampling is actual (the time is after the proposed sampling time, but before the term of the sampling, where term of the sampling = proposed sampling time + acceptable difference)
- red : sampling is missed (was not done in proposed time period)  
*this status is valid till next sampling checking, because at the time program will schedule following sampling, and red status will be placed into previous status (or rather if only sampling by events is enabled, this row will be removed out of the status matrix)*
- grey : sampling was done in proposed time period, but the following sampling has not been already scheduled  
*process is waiting for scheduling (according to defined running rate), or sampling control is turned off*

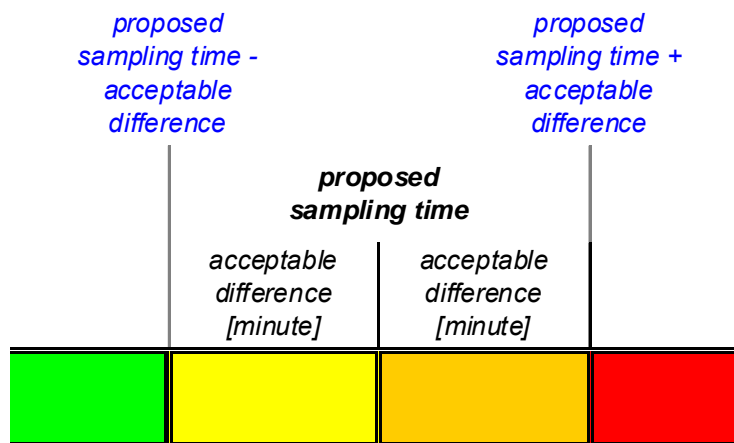


Figure 20: Meaning of the colours of the sampling status

**Attention!**

Status matrix always contains the actual state related to last update.

### 6.3 Menu and status rows of the status matrix

Status matrix has its own menu and status row. In the menu, the display order of the status matrix can be set and other service functions can be accessed.

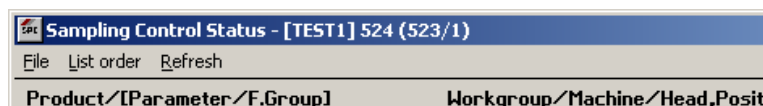


Figure 21: Menu row of the status matrix

### 6.3.1 File menu

In the **File** menu, the sampling control log can be displayed with the help of the **View log** menu item, and the status matrix display can be quit through the **Logoff (close)** menu item.

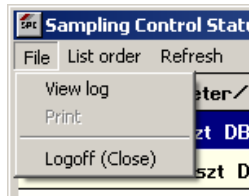


Figure 22: Menu row of the status matrix

### 6.3.2 List order menu

In the **List order** menu, the display order of the status matrix lines can be selected as follows.

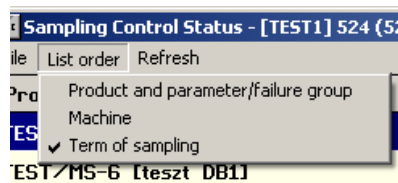


Figure 23: File menu of the status matrix

### 6.3.3 Refresh menu

If the **Refresh automatically** option of the **Refresh** menu is enabled, then the software will refresh the status matrix automatically, every 1 minutes. With the help of the **Refresh now** menu item, the status matrix can be refreshed instantly.

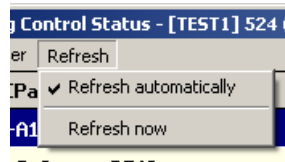


Figure 24: Refresh menu of the status matrix

## 7 Functions for the operator access level

Displaying of the status matrix and input a sampling event can be enabled for operator access level - in the **Operator's rights** menu item of the **Settings** menu, on engineer access level.



Figure 25: Enabling sampling control function for the operator

Both above function can be enabled for operator access level by the **Enable using of Sampling Control functions** switch. Therefore will be found plus buttons for displaying **status** matrix and entering an **event**.

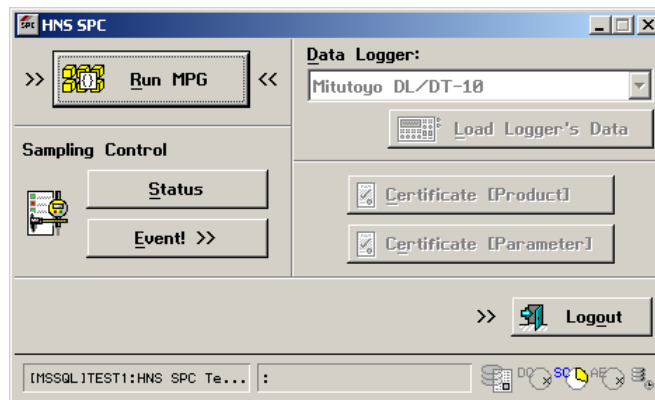


Figure 26: User surface for operator access level

Description about these functions can be found in the chapters **Status matrix**, and **Manual sampling events - Enter an event**.

In these functions operator cannot display sampling control log, and also cannot start a prompt checking (monitoring).

## 8 Sampling time calculation

Program calculates the following sampling time and changes the status of a sampling after principles as follows.

### 8.1 In case of sampling by time

- By appointing a process for sampling monitoring
  - the basis of the first sampling time calculation is the start time of the actual shift. If there is not any shift going on, then the start time of the next shift.
  - the following sampling time is the first time calculated by shift start time (and *first sample after shift-start*) and sampling frequency values, which is not over, its status is green, or yellow (orange is not possible).
  - if **Restart scheduling on every shift-start** switch is on, then *first sample after shift-start* value = 0.
  - status of previous sampling is always grey.
- If sampling frequency are modified (that means, that the **Sampling control settings** window and also the **Process settings** window in the **Process settings - Change** menu item of the **Database** menu is closed with **OK** button), than the program schedules the next sampling time again - after the rules in previous point, as the process would be appointed for sampling monitoring this time.
- If next shift comes continually (without intermission) after actual shift, and **Restart scheduling on every shift-start** switch is on, than the term of the last sampling in the actual shift can be the shift closing time at latest.
- If **Restart scheduling on every shift-start** switch is off or next shift comes with intermission (not continually) after actual shift, than the last sampling time cannot, but the term of the last sampling can be outside of the shift closing time.
- Basic date and time used for calculations is in case of continuous operating
  - in case of absolute calculation the proposed time of the previous sampling,
  - in case of relative calculation the real time of the previous sampling.
  - in case of relative calculation, if previous sampling is missed, than the proposed time of the previous sampling.
- Only the time spend in shift (supposed production time) counts by the calculation of the following sampling time - apart from the fact that sampling can be fallen out of shift because of acceptable difference.

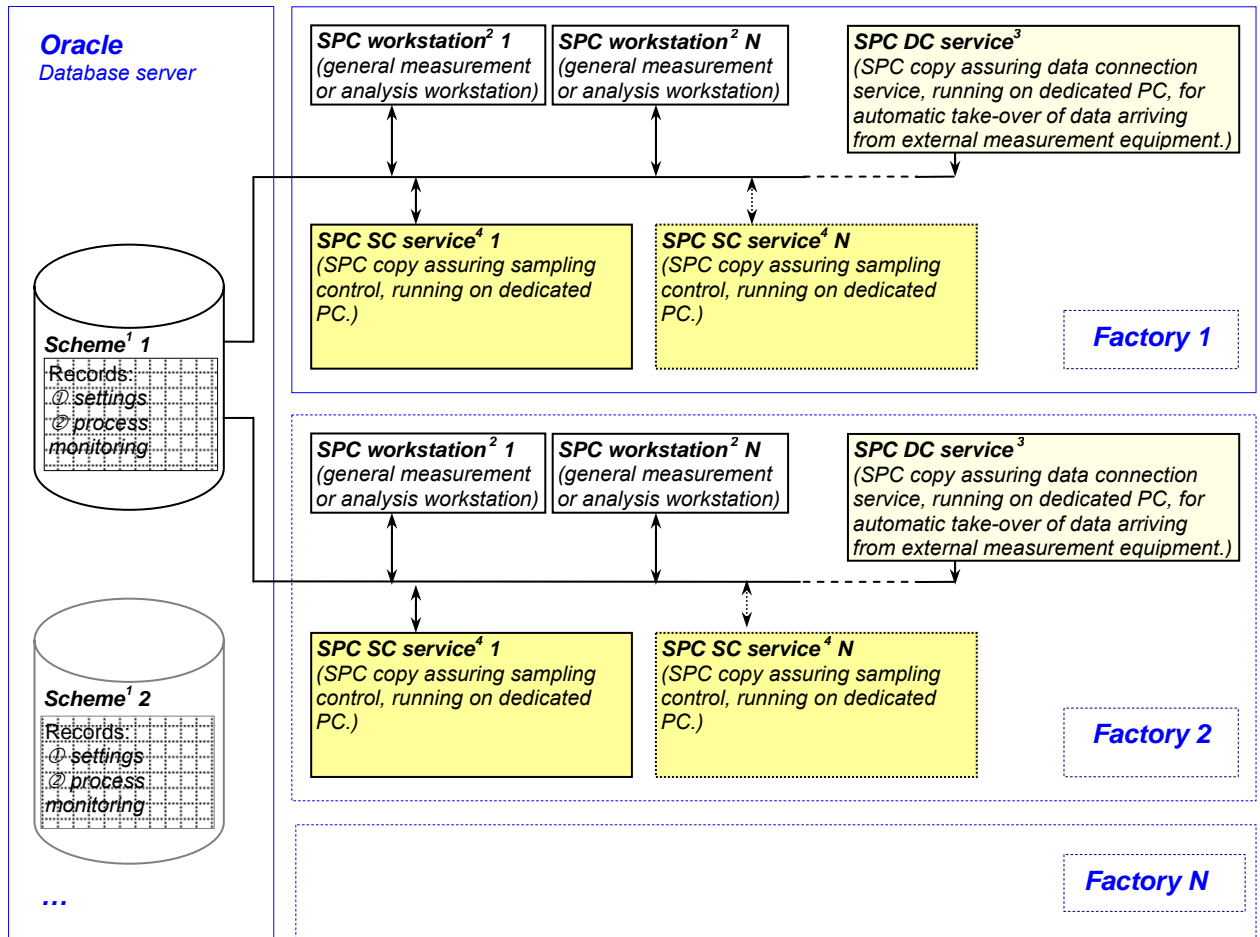
### 8.2 In case of sampling frequency by events

- Previous status is always grey at scheduling a sampling by event (without reference to enabling or disabling the sampling frequency by time).
- If a sampling by an event is scheduled for a process, and an other event occurs within the term of this sampling - related to the same process, the program will update the scheduled sampling with the last event (or rather with the sampling time generated to it).
- If an eev file contains more events (more rows) by a loading, the program will schedule for sampling the event with last date and time, and the rest of the events will be deleted. If there is not any date and time recorded related to events, than the program will schedule for sampling the event in the last row. The date and time of the event will be the file's last modifying date and time.

### 8.3 In case of sampling frequency by time and events

- A sampling generated by an event writes the previous - by time - scheduled sampling over. The following sampling after the doing or missing (run out the term) of the sampling by event will be scheduled related to the (proposed or real) time of the sampling by event.
- **Data input outside of the specified time period is not taken into account in any way.**

## Sampling control Typical system structure



### Attention!

In order to use the sampling control function, it is necessary to update the database objects (previously created tables) used by SPC and to introduce new objects (new tables, indices and triggers), i.e. to update the database:

**the necessary database version V1.12.**

Updating can be done by running the PL-SQL script handed over as a part of the SPC installation kit:

**UPGRADE12.SQL.**

Legend and notes

#### 1 - Scheme

Independent database schemes for storing SPC data – a possibility assured by the SPC system.

#### 2 - SPC workstation 1, 2 ... N

An optional number of general-purpose SPC measurement workstations for data input by the operator, using the measurement programs and general-purpose SPC engineer workstation for evaluating the data, respectively.

### **3 - SPC DC service**

SPC station assuring continuous DataConnection service.

The SPC software's DataConnection service assures the automatic receipt of the measured and attributed samples arriving from external data sources and their forwarding to the SPC database. This service is an in-built function of the SPC program, which has to be authorised separately. In case this function is enabled, the given SPC program becomes an individual DataConnection server. In an SPC system, an optional number of such servers can be operated but in general it is enough to operate one single station.

In extensive SPC systems also embracing automatic measurement equipment, for managing the data coming from the measurement equipment it is suggested to constantly run the SPC program copy assuring the DataConnect service thus to install it onto a constantly operating PC reserved especially for this reason, i.e. dedicated to this purpose ⇒ *on-line service*.

### **4 - SPC SC (Sampling Control) service**

The SPC station assuring sampling control.

Similarly to the DataConnection, the SPC program contains the service as in-built, which also has to be enabled. When the service is enabled, the software becomes an SC server. The notices are sent to the responsible persons by e-mail so obviously a mail server is also necessary which is accessible to the software.

Given the function's character it requires continuous operation so it is useful to assure the service through an SPC program running on an independent, dedicated PC.

In case the speed of data entry makes it necessary, then several SC servers can be operated in the SPC system in parallel. In the case of several SC servers, the sharing of load can be influenced by the running rates set in the individual SPC programs - see chapter *Sampling control settings* - it is practical to set different running rate on the individual servers (e.g. 10 minutes on the first server, 20 minutes on the second one, ...) so the individual servers only join in to assure the service in case it is actually needed.

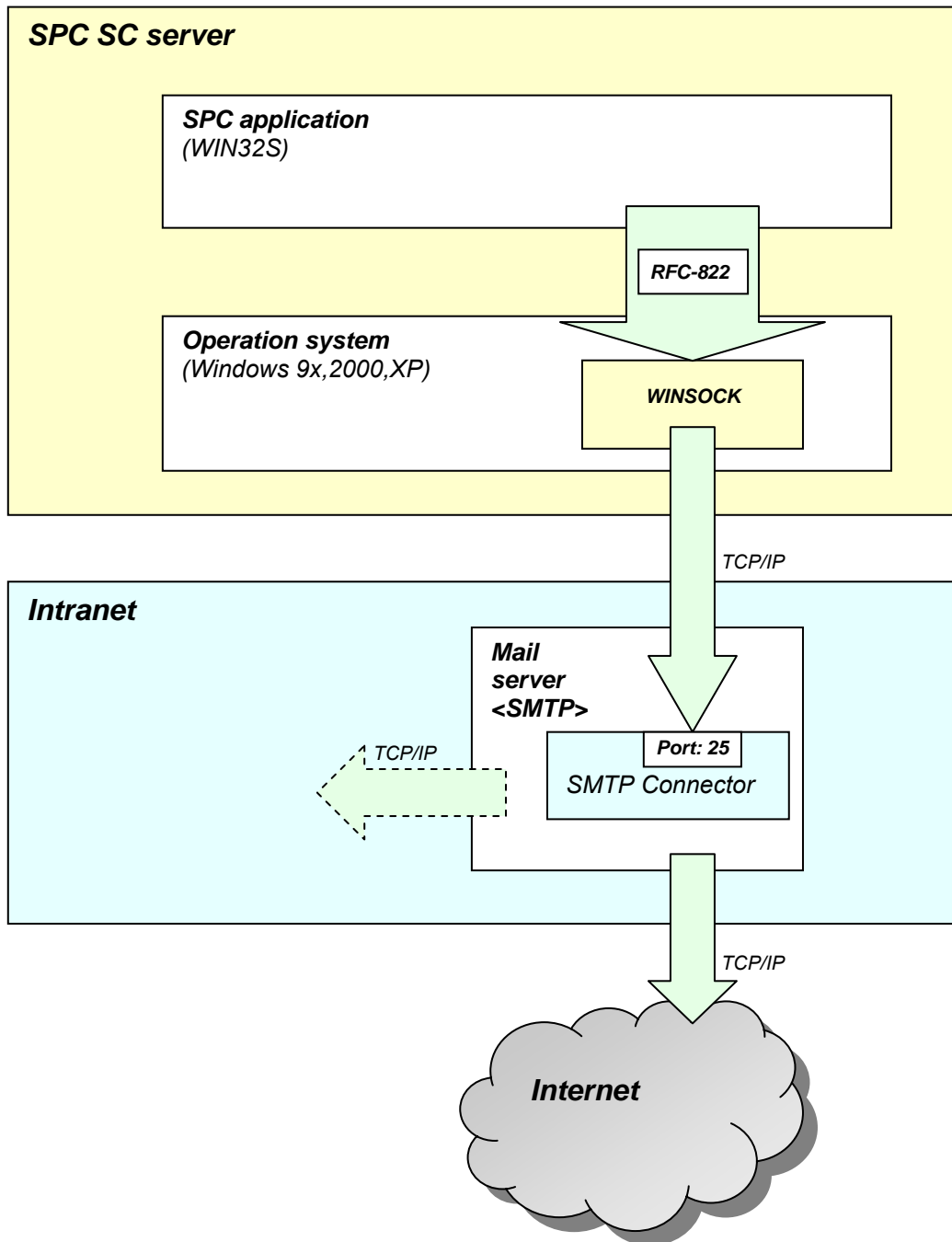
*Sampling control*  
**Task sharing in the system**

<b>Database</b>	<b>Client</b>	<b>Sampling control (SC) service</b>
registers new samples for scheduling	schedules the first sampling by enabling sampling control function / settings related to a process	schedules the following sampling by sampling / missing sampling
	schedules the prompt sampling by occurrence a manual event	schedules the prompt sampling by occurrence an automatic event
	updates the status of scheduled samplings (green - yellow - orange - red)	sends e-mails

**Note**

*In sampling control log is entered only that actions (performed tasks) related to a given process which were performed by sampling control (SC) service – by reason of technical possibilities.*

**Sampling control  
E-mail technology**



**Note**

The SPC software generates a one-way process – sending mails by using an SMTP protocol. No mail downloading function is implemented in the software.

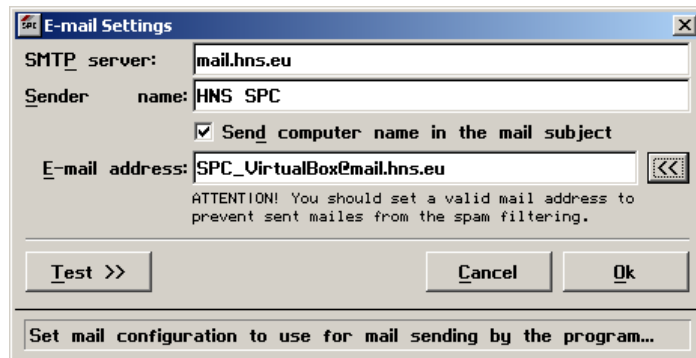
No reply can be sent to the mails sent by the SPC software - return-path value is '???@???'.

**The SPC software sends mail only in a way controlled by the user according to their intentions.**

*Sampling control*  
**Program settings required for sending e-mails**

The software sends e-mails in a way outlined in the previous appendix, by using an SMTP server and the software does not download e-mails.

The E-mail settings can be specified in the **E-mail** menu item of the software's **Settings** menu:



**SMTP server**

In this field you have to specify the SMTP server's name (DNS) or IP address.

**Sender name**

In this field you have to specify the name wished to appear in the sender field of the sent mails.

**Send computer name in the mail subject**

By ticking this box, you can turn on the function that the software should automatically attach the name of the computer running the e-mail sending programme to the sender name. If this possibility is turned on, then the computer sending the mail can be clearly identified on the network, which might be necessary in case more extensive applications using several automatic assessment workstations in parallel are used.

**E-mail address**

In sent mails, any e-mail address can be specified as the sender's e-mail address.

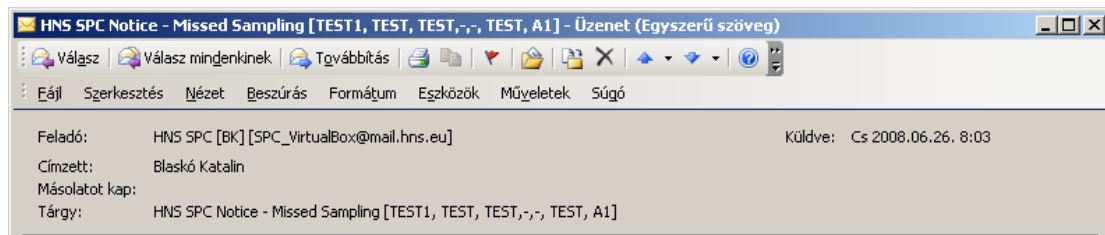
It depends on the sending but primarily on the receiving mailing system, what e-mail address has to be provided here. As default, the software suggests such a non-existing e-mail address that refers the fact that the mail is sent by the SPC software: *SPC\_VirtualBox*. The domain name can also be specified optionally. If the << button is pressed, the software inserts the name given in the SMTP server field to the mailbox name.

**Attention!**

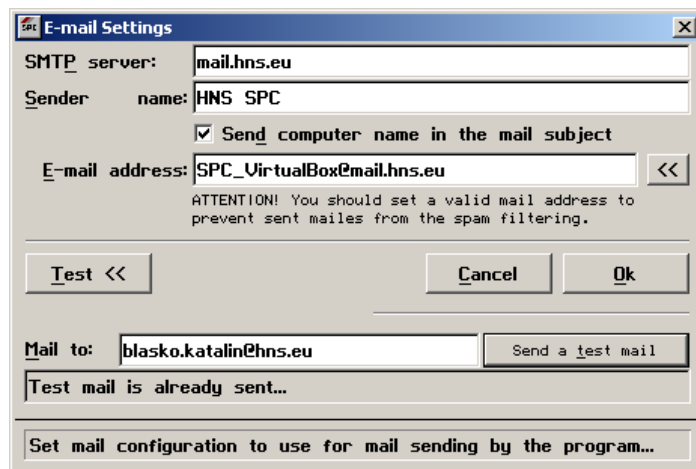
*The recipient receiving the mail might use a SPAM filter, which fact have to be taken into consideration when specifying the sender's e-mail address:*

- *the SPAM filter might check the domain name: an existing and valid name has to be provided or otherwise the recipient will not get the mail sent by the SPC software,*
- *the SPAM filter might check the sender's whole e-mail address: in this case a valid e-mail address have to be provided,*
- *in case the SPAM filter on the recipient side checks the sender side with an request of acknowledgement – the SPC software obviously cannot handle this – then the recipient has to assure separately that the filter "lets through" the mails sent by the SPC software.*

The e-mail sent with the above settings arrived with the following heading:



It is also possible to check the E-mail Settings directly in the settings window by sending a test mail. To do so, you have to press the **Test** button:



In the unfolding part of the window, enter the e-mail address - **Mail to** -, where you would like to send the test mail and then press the **Send a test mail** button. The software will send the mail and will indicate the status of sending: *Test mail is already sent* or *ERROR, test mail can not be sent*.

The test mail will be as follows:

