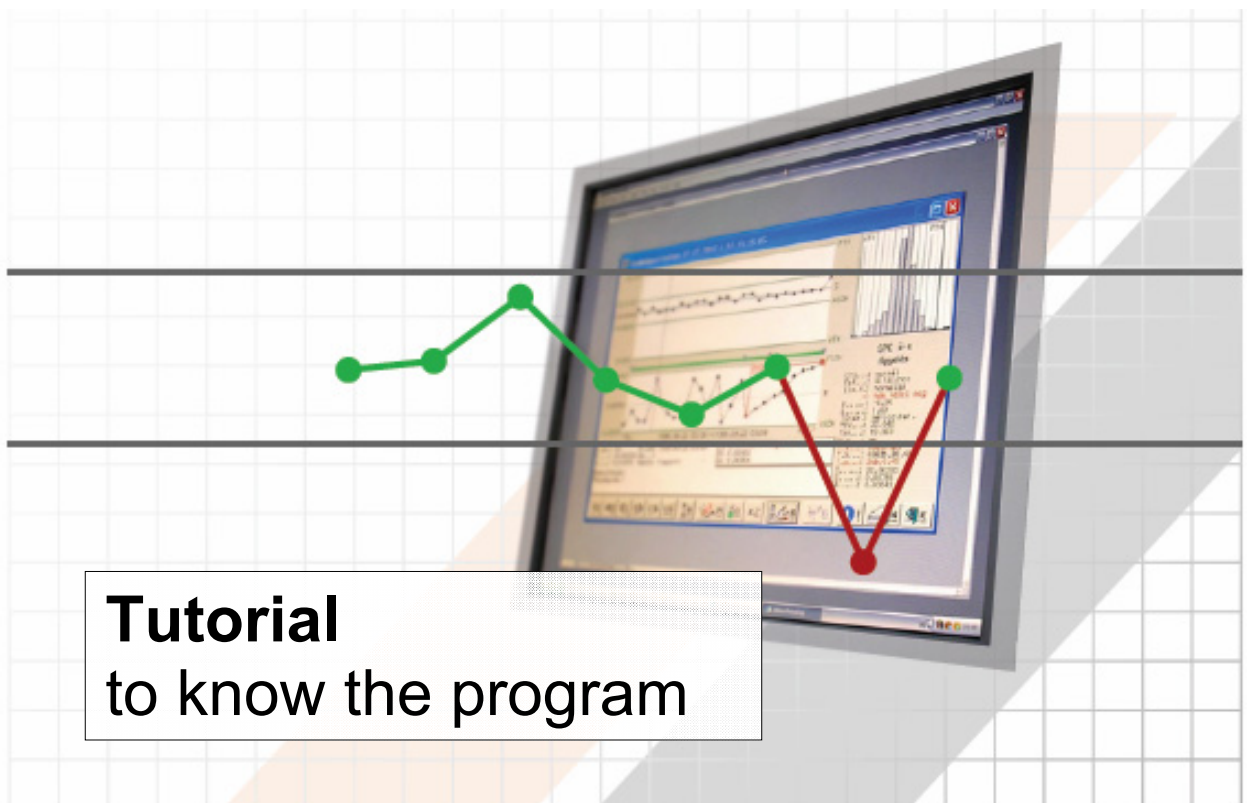


# HNS SPC<sup>ea</sup>

Statistical process and quality control



**Tutorial**  
to know the program

**HNS SPC<sup>ea</sup>**

Statistical process and quality control

**Tutorial to know the program**

2009 September 25

**HNS SPC<sup>ea</sup>**

Statistical process and quality control

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# 1 Content of the tutorial

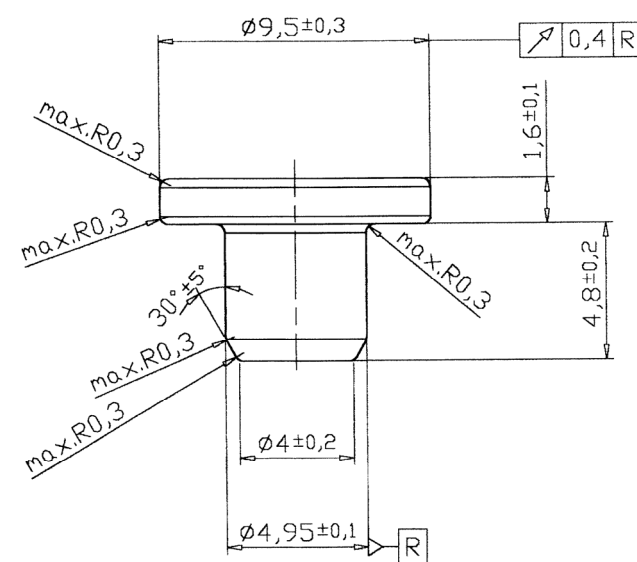
This tutorial presents

- ➔ creating the database needed to the measuring of the part,
- ➔ measuring the parameters prescribed in the control plan,
- ➔ analysing the recorded data,

step by step, by the example of the steel rivet, which can be seen in the following picture.

The tutorial contains the preparations required to make the steps above (for example installation of the measuring workplace).

Further knowledge about the several functions can be found in the user's manual of the program.

CONTROL PLAN					
Part's name: <b>Steel rivet</b>			Operation: <b>Final inspection</b>		
Drawing nr.: <b>S 49548-T</b>		Material: <b>QSt 36-2</b>		Weight: <b>1,6 gr / pc</b>	
					
Nr.	Parameter	Specification	Based on	Gauge	Sampling frequency
1.	Total length	$6,4 \pm 0,3$	Drawing	Caliper	5 pcs/4 hours
2.	Head length	$1,6 \pm 0,1$	Drawing	Caliper	5 pcs/4 hours
3.	Head diameter	$\varnothing 9,5 \pm 0,3$	Drawing	Micrometer	5 pcs/4 hours
4.	Stalk diameter	$\varnothing 4,95 \pm 0,1$	Drawing	Micrometer	5 pcs/4 hours

The product is produced on two turning-machines - one with the ID A-11 and the other with the ID A-12.

## 2 Installation of the required environment

### 2.1 Installation of the program

See the chapter 1.3 *Installation of the program* in the *User's manual*.

### 2.2 Creating the pictures to be displayed

The BMP files, which are in the *Tutorials\Pictures* directory of the installation CD, should be copied into an optional directory (the pictures can be downloaded from the page [www.hns.eu/spc](http://www.hns.eu/spc), too). *C:\Tutorial\Pictures* directory is used to store the pictures in this example. In case of using another directory, the actual path of the pictures should be selected in the *Image* field at creating the product and the parameters - contrary to the path in the screen-images in this tutorial.

### 2.3 Connecting the gauges

Required equipment:

- HNS SMUX-4 / HNS USBMUX-4 (MITUTOYO Digimatic-compatible interface),
- Mitutoyo Digimatic caliper (type: 500-161U),
- Mitutoyo Digimatic connecting cable for the caliper (type: 959149, 959150),
- Mitutoyo Digimatic micrometer (type: 293-521-30),
- Mitutoyo Digimatic connecting cable for the micrometer (type: 937387).

Steps of the connection of the gauges:

- connecting the HNS SMUX-4 interface to the COM1 serial port of the computer, or connecting the HNS USBMUX-4 interface to one of the USB ports of the computer (this interface requires to install a driver program - if it has not been installed yet -, see the chapter 1.3.1 *Installation of the interface* in the *User's manual*)
- connecting the connecting cable (959150 or 959149) into the data output of the caliper („ABSOLUTE” DIGIMATIC caliper / 500-161U),
- connecting the connecting cable to the CH0 channel of HNS SMUX-4 / HNS USBMUX-4 interface,
- connecting the connecting cable (937387) into the data output of the micrometer (DIGIMATIC micrometer 0-25 mm / 293-521-30),
- connecting the connecting cable to the CH1 channel of HNS SMUX-4 / HNS USBMUX-4 interface,
- switching on and testing the gauges.

### 2.4 Starting the program

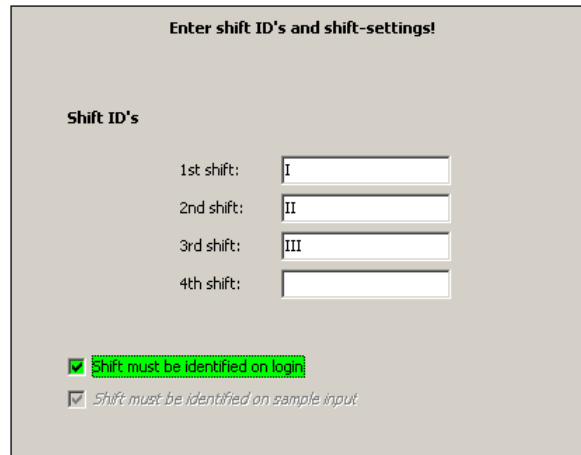
See the chapter 2.2 *Starting the program* in the *User's manual*.

## 3 Settings

### 3.1 Shift settings

Choose the **Settings** menu item of the main menu, and then the **Shifts** menu item of the sub-menu.

Give the shift identifiers to be used, and switch on the **Shift must be indentified on login** switch in the displayed window.

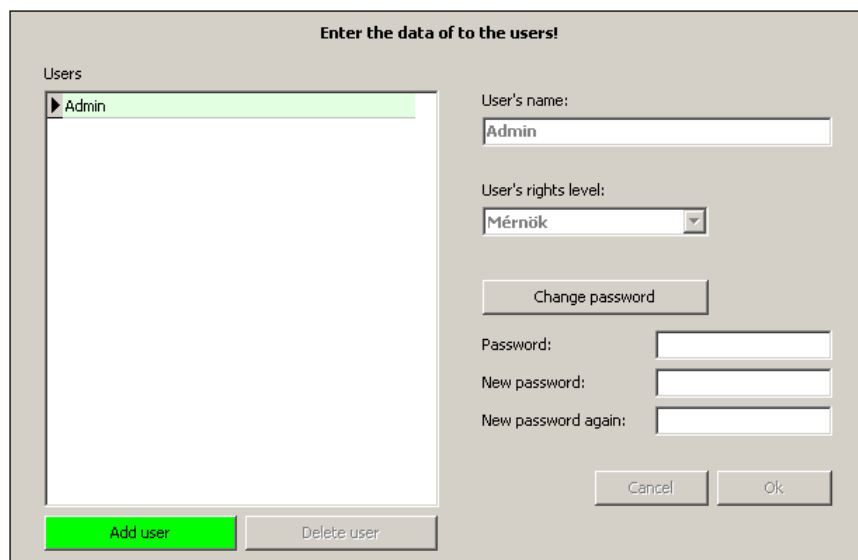


Exit from the **Settings** menu with the  button, which is the last button of the sub-menu.

### 3.2 Users

Choose the **Users** menu item of the main menu.

Press the **Add user** button in the displayed window.



Add yourself to the users on engineer rights level, and then press the **Ok** button. Yours password should be *spc*.

**Enter the data of to the users!**

Users

Admin
* XY

Add user    Delete user

User's name:

User's rights level:

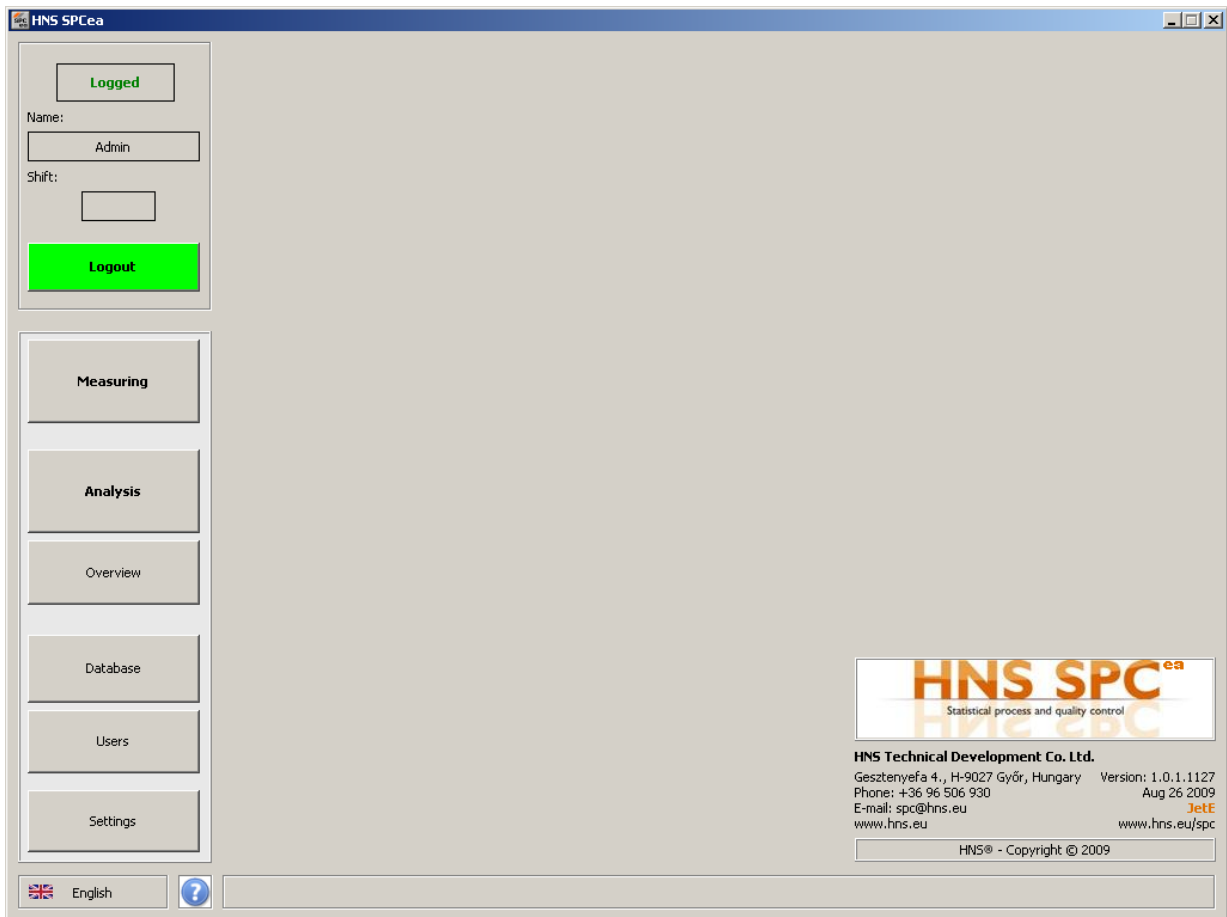
Password:

New password:

New password again:

Exit from the **Users** menu with the  button, which is the last button of the sub-menu.

Logout from the program with the **Logout** button.



The screenshot shows the HNS SPCea software interface. On the left, there is a vertical menu with buttons for 'Measuring', 'Analysis', 'Overview', 'Database', 'Users', and 'Settings'. The 'Users' button is highlighted. In the top-left corner, there is a 'Logged' button and a 'Logout' button (highlighted in green). Below the 'Logged' button, there are input fields for 'Name' (containing 'Admin') and 'Shift'. The bottom of the interface features a language selector set to 'English', a help icon, and a footer with contact information for HNS Technical Development Co. Ltd., including address, phone, email, website, and version information (1.0.1.1127, Aug 26 2009).

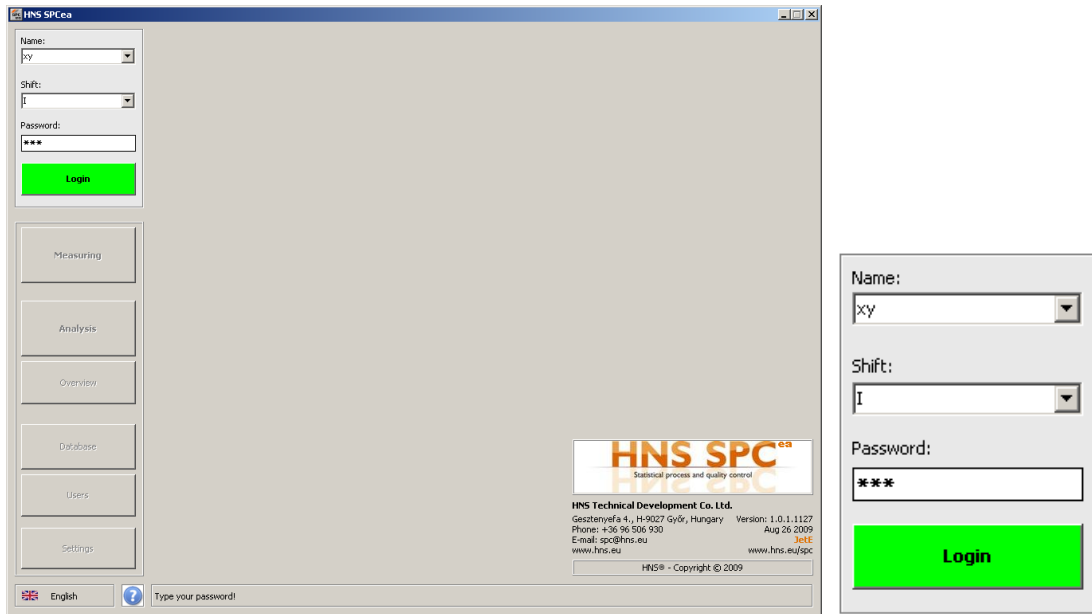
Log into the program as the user added before.

Give the user's name, the identifier of the current shift and the password, and then press the **Login** button.

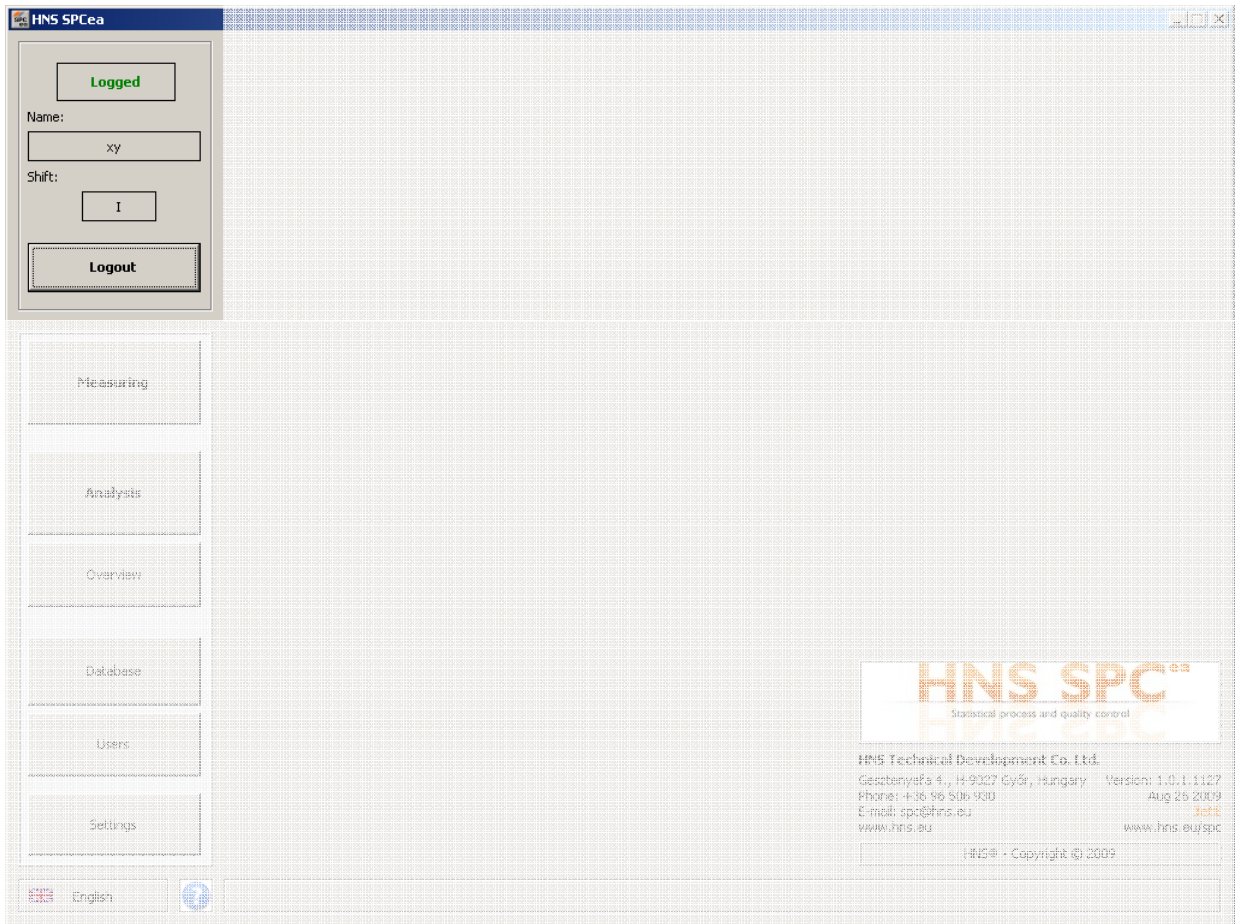
**Note**

*The user's name can be selected out of the users occurred in the user registration.*

*The shift ID can be selected out of the values given in the shift settings menu item.*



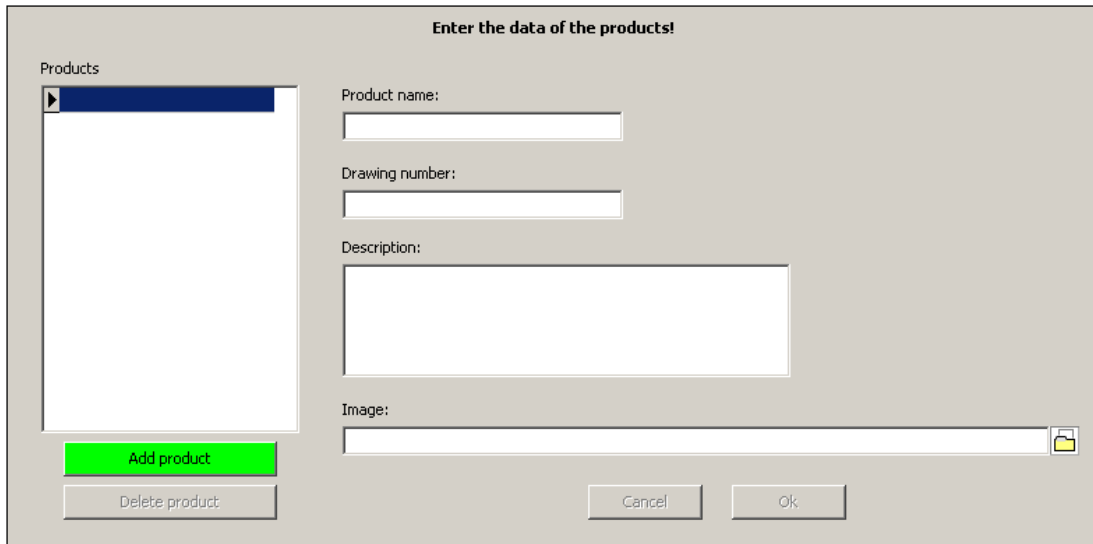
After the successful login, following user and shift data are displayed in the left-upper section of the window.



## 4 Building the database

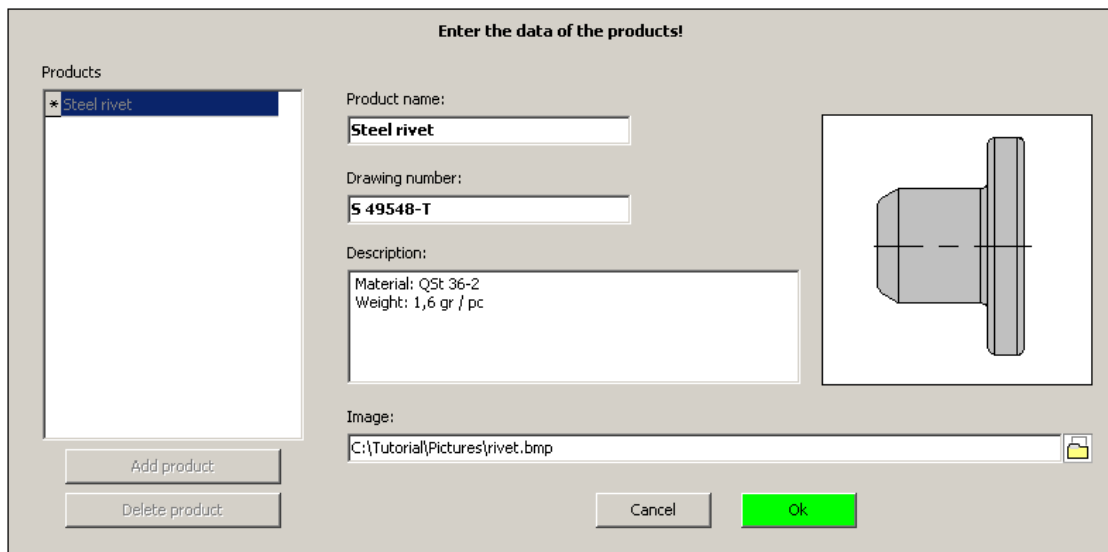
### 4.1 Adding the product

Choose the **Database** menu item of the main menu, and then the **Products** menu item of the sub-menu. Press the **Add product** button in the displayed window.



The screenshot shows a dialog box titled "Enter the data of the products!". On the left, there is a list box labeled "Products" which is currently empty. Below it are two buttons: "Add product" (highlighted in green) and "Delete product". To the right of the list box are four input fields: "Product name:", "Drawing number:", "Description:", and "Image:". The "Image:" field has a folder icon on its right side. At the bottom right of the dialog are "Cancel" and "Ok" buttons.

Enter the product's data and press the **Ok** button.



The screenshot shows the same dialog box, but now the "Products" list contains one item: "\* Steel rivet". The "Add product" button is now disabled (greyed out). The "Product name:" field contains "Steel rivet", the "Drawing number:" field contains "S 49548-T", and the "Description:" field contains "Material: QSt 36-2" and "Weight: 1,6 gr / pc". The "Image:" field now contains the file path "C:\Tutorial\Pictures\rivet.bmp" and has a small image icon on its right side. The "Ok" button is now highlighted in green.

### 4.2 Adding the parameters

Choose the **Database** menu item of the main menu, and then the **Parameters** menu item of the sub-menu. Select the *Steel rivet* product in the **Product** field, and then press the **Add parameter** button, in the displayed window.

#### **Attention!**

*The number of the port used for connecting the gauge (interface) on the given computer actually has to be selected in the port field.*

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters:

Parameter name:

Unit:

Specification: #

USL #:

LSL #:

Sample size: \*  Chart size:

Decimals:  Kind of chart: \*

Gauge:  Type of chart:

Port: --- Control limits:

Channel: --- UCL x --- R/s ---

Required capability:  LCL x --- R/s ---

Image:

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Give the data of the first, *Total length* parameter, and then press the **Ok** button.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: \* Total length

Parameter name: **Total length**

Unit: **mm**

Specification: # **double sided**

USL #: **6,7**

LSL #: **6,1**

Sample size: \* **5** Chart size: **25**

Decimals: **2 [0,01]** Kind of chart: \* **x-s**

Gauge: **HNS SMUX (Digimatic)** Type of chart: **monitoring**

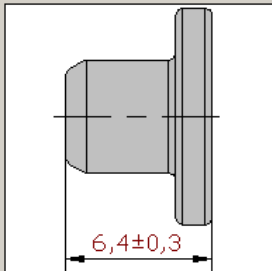
Port: **COM1** Control limits: **calculated**

Channel: **0** UCL x --- R/s ---

Required capability: **1,33** LCL x --- R/s ---

Image:

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!



Press the **Add parameter** button again.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: **Total length**

Parameter name: **Total length**

Unit: **mm**

Specification: **# double sided**

USL: **# 6,7**

LSL: **# 6,1**

Sample size: **\* 5**

Decimals: **2 [0,01]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **0**

Required capability: **1,33**

Image: **C:\Tutorial\Pictures\total\_length.bmp**

Chart size: **25**

Kind of chart: **\* x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL: x --- R/s ---

LCL: x --- R/s ---

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Give the data of the second, *Head length* parameter, and then press the **Ok** button.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: **Total length**  
**\* Head length**

Parameter name: **Head length**

Unit: **mm**

Specification: **# double sided**

USL: **# 1,7**

LSL: **# 1,5**

Sample size: **\* 5**

Decimals: **2 [0,01]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **0**

Required capability: **1,33**

Image: **C:\Tutorial\Pictures\head\_length.bmp**

Chart size: **25**

Kind of chart: **\* x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL: x --- R/s ---

LCL: x --- R/s ---

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Press the **Add parameter** button again.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: Total length, **Head length**

Parameter name: **Head length**

Unit: **mm**

Specification: # **double sided**

USL #: **1,7**

LSL #: **1,5**

Sample size: \* **5**

Decimals: **2 [0,01]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **0**

Required capability: **1,33**

Image: C:\Tutorial\Pictures\head\_length.bmp

Chart size: **25**

Kind of chart: \* **x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL x --- R/s ---

LCL x --- R/s ---

**Add parameter** **Delete parameter** **Cancel** **Ok**

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Give the data of the third, *Head diameter* parameter, and then press the **Ok** button.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: Total length, Head length, \* **Head diameter**

Parameter name: **Head diameter**

Unit: **mm**

Specification: # **double sided**

USL #: **9,8**

LSL #: **9,2**

Sample size: \* **5**

Decimals: **3 [0,001]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **1**

Required capability: **1,33**

Image: C:\Tutorial\Pictures\head\_diameter.bmp

Chart size: **25**

Kind of chart: \* **x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL x --- R/s ---

LCL x --- R/s ---

**Add parameter** **Delete parameter** **Cancel** **Ok**

**ATTENTION!** #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Press the **Add parameter** button again.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: Total length, Head length, **Head diameter**

Parameter name: **Head diameter**

Unit: **mm**

Specification: # **double sided**

USL #: **9,8**

LSL #: **9,2**

Sample size: \* **5**

Decimals: **3 [0,001]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **1**

Required capability: **1,33**

Image: C:\Tutorial\Pictures\head\_diameter.bmp

Chart size: **25**

Kind of chart: \* **x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL x --- R/s ---

LCL x --- R/s ---

**Add parameter** **Delete parameter** **Cancel** **Ok**

ATTENTION! #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

Give the data of the fourth, *Stalk diameter* parameter, and then press the **Ok** button.

**Enter the data of the parameters!**

Product: **Steel rivet**

Parameters: Total length, Head length, Head diameter, \* **Stalk diameter**

Parameter name: **Stalk diameter**

Unit: **mm**

Specification: # **double sided**

USL #: **5,05**

LSL #: **4,85**

Sample size: \* **5**

Decimals: **3 [0,001]**

Gauge: **HNS SMUX (Digimatic)**

Port: **COM1**

Channel: **1**

Required capability: **1,33**

Image: C:\Tutorial\Pictures\stalk\_diameter.bmp

Chart size: **25**

Kind of chart: \* **x-s**

Type of chart: **monitoring**

Control limits: **calculated**

UCL x --- R/s ---

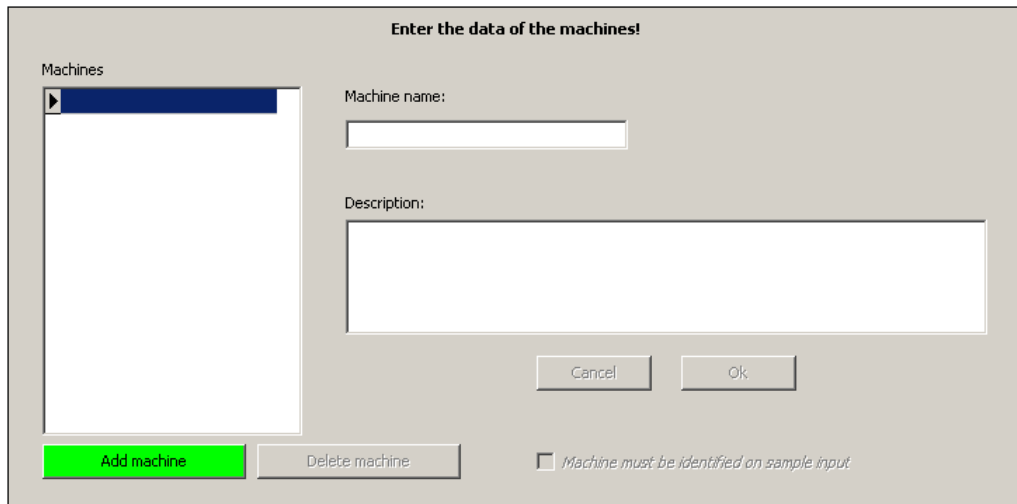
LCL x --- R/s ---

**Add parameter** **Delete parameter** **Cancel** **Ok**

ATTENTION! #: when the specification is changed, the statuses of the data stored in the database are re-evaluated, therefore the process may take up more minutes depending on the number of the measured values.  
\*: sample size and kind of chart cannot be changed later!

### 4.3 Creating the machine list

Choose the **Database** menu item of the main menu, and then the **Machines** menu item of the sub-menu. Press the **Add machine** button, in the displayed window.



Enter the data of the machines!

Machines

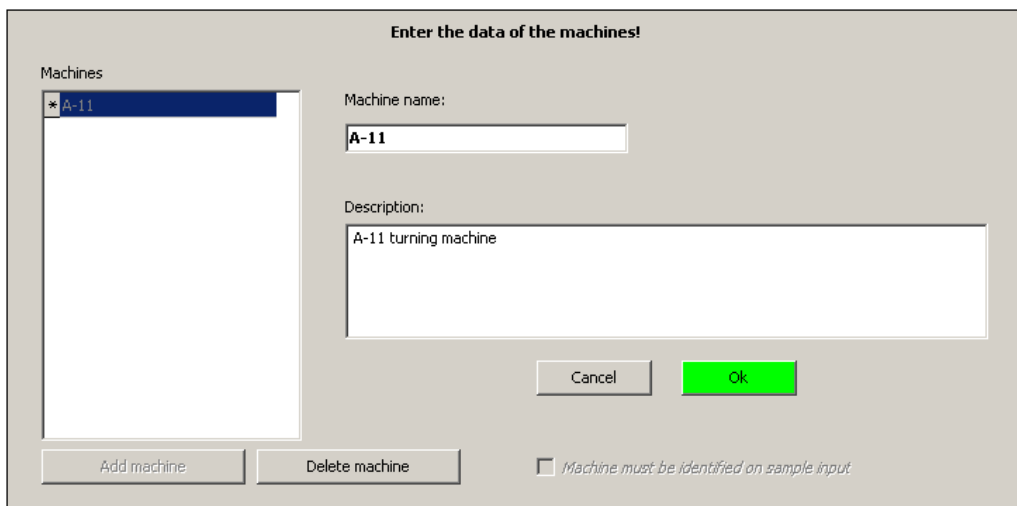
Machine name:

Description:

Cancel Ok

Add machine Delete machine  Machine must be identified on sample input

Give the data of the first machine, and then press the **Ok** button.



Enter the data of the machines!

Machines

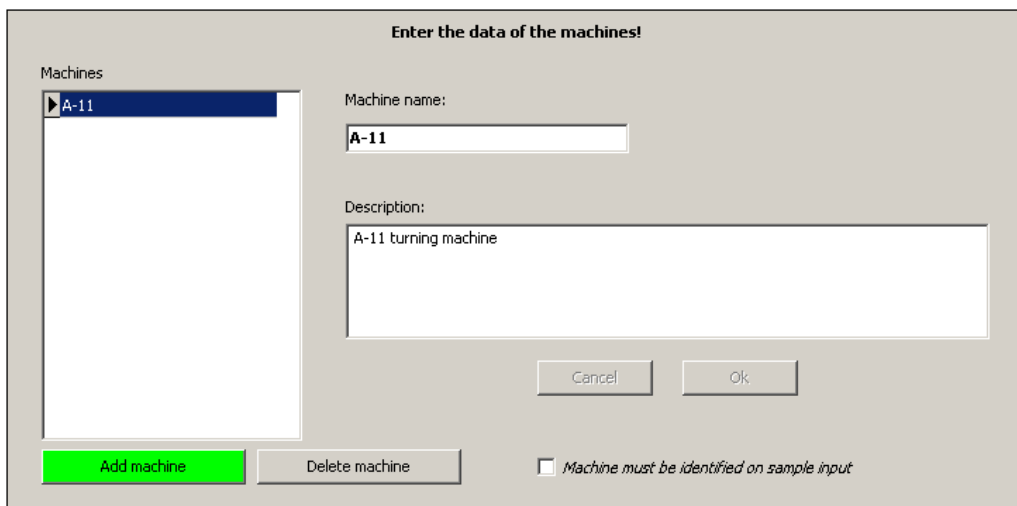
Machine name:

Description:

Cancel Ok

Add machine Delete machine  Machine must be identified on sample input

Press the **Add machine** button again.



Enter the data of the machines!

Machines

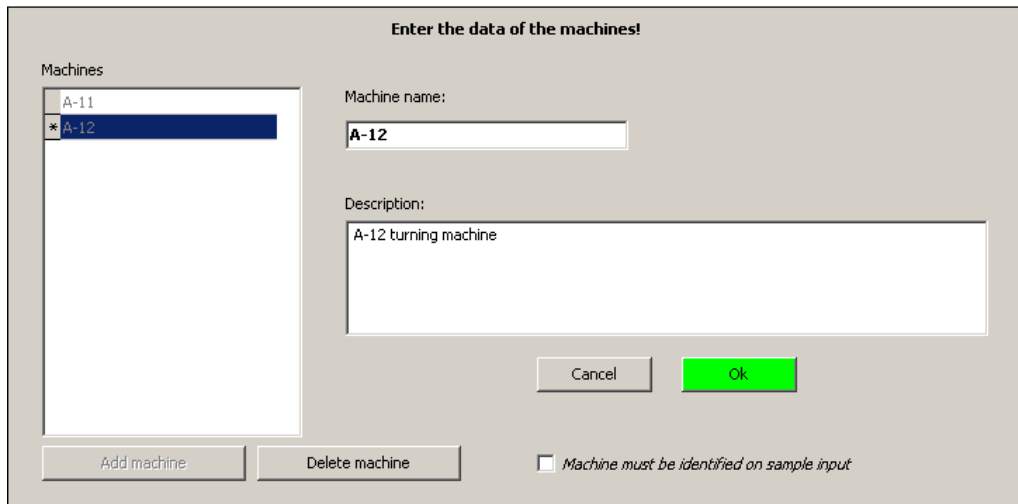
Machine name:

Description:

Cancel Ok

Add machine Delete machine  Machine must be identified on sample input

Give the data of the second machine, and then press the **Ok** button.



**Enter the data of the machines!**

Machines

- A-11
- \* A-12

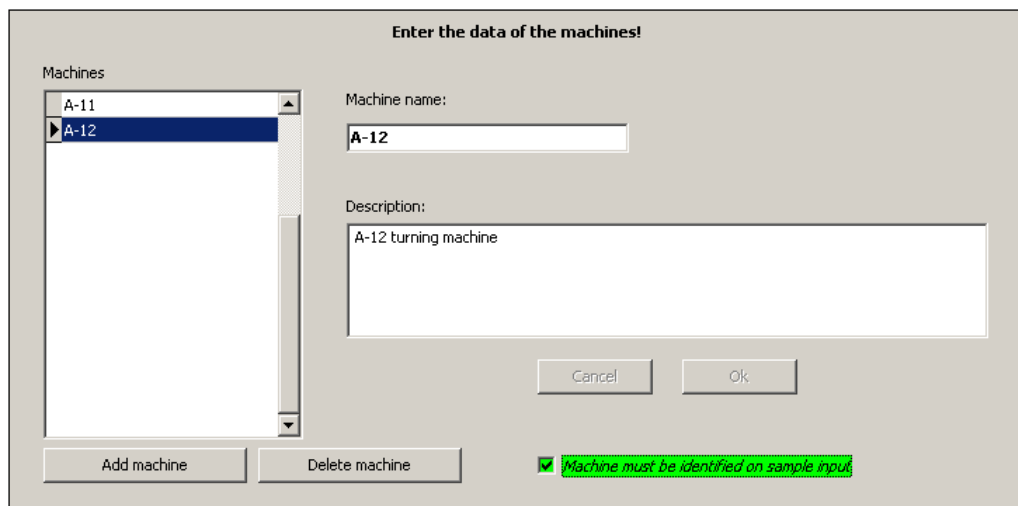
Machine name: A-12

Description: A-12 turning machine

Cancel Ok

Add machine Delete machine  Machine must be identified on sample input

Switch on the **Machine must be identified on sample input** switch.



**Enter the data of the machines!**

Machines

- A-11
- ▶ A-12

Machine name: A-12

Description: A-12 turning machine

Cancel Ok

Add machine Delete machine  Machine must be identified on sample input

## 5 Measuring

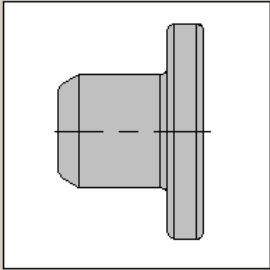
Choose the **Measuring** menu item of the main menu. Select the *Steel rivet* product, and then press the **Next** button, in the displayed window.

**Select product to measure!**

Name	Drawing number
▶ Steel rivet	S 49548-T

Up

Down



Description:

Material: QSt 36-2  
Weight: 1,6 gr / pc

Cancel

Next ▶

### 5.1 Measuring the total length

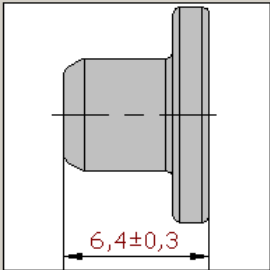
Select the *Total length* parameter, and then press the **Next** button, in the displayed window.

**Select parameter to measure!**

Name	Unit	Sample size
Head diameter	mm	5
Head length	mm	5
Stalk diameter	mm	5
▶ Total length	mm	5

Up

Down



6,4±0,3

Previous

Next ▶

Enter the identifiers to record with the sample, and then press the **Next** button, in the displayed window.

#### Note

*Sampling time and Shift fields are filled in automatically (the shift identifier is the value given at the login).*

*Machine ID can be selected out of the machines recorded in the database.*

*Optional value can be entered as LOT ID.*

**Enter the sample data!**

Sampling time: 2009.08.13. 13:22:39

Machine: A-11  
A-11  
A-12

LOT: 123456-00

Shift: I  
II  
III

Measure the total length of the first part with the caliper, and then press the **Measure** button.

*Comment*

If the gauge is off, program will display an error message about it. After turning on the gauge, the **Switch on the gauge** button has to be pressed to check the gauge again.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

**Product**

Name:

Drawing number:

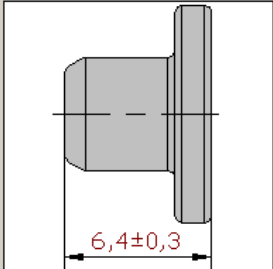
No.	Measured value
1	
2	
3	
4	
5	

6,57

USL

[Bar chart with green fill]

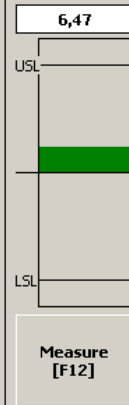
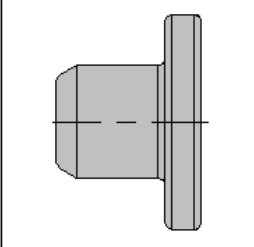
LSL



6,4±0,3

Measure the specified five pieces in all in the same way, and then press the **Save data** button if measured values are not wanted to modify.

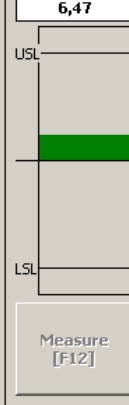
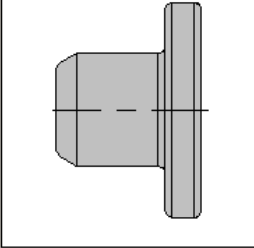
**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

<b>Product</b>		<table border="1"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>6,57</td></tr> <tr><td>2</td><td>6,64</td></tr> <tr><td>3</td><td>6,31</td></tr> <tr><td>4</td><td>6,44</td></tr> <tr><td>5</td><td>6,47</td></tr> </tbody> </table>	No.	Measured value	1	6,57	2	6,64	3	6,31	4	6,44	5	6,47	<div style="text-align: center;">6,47</div>  <div style="text-align: center;">Measure [F12]</div>	 <div style="text-align: center;">Up</div> <div style="text-align: center;">Down</div> <div style="text-align: center; background-color: green; color: black; padding: 5px;"><b>Save data</b></div>
No.	Measured value															
1	6,57															
2	6,64															
3	6,31															
4	6,44															
5	6,47															
Name:	Steel rivet															
Drawing number:	5 49548-T															
<b>Parameter</b>																
Name:	Total length															
Unit:	mm															
Specification:	LSL: 6.10 USL: 6.70															
Gauge:	HNS SMUX (Digimatic)															
port	COM1															
channel	0															

◀ Previous Next ▶

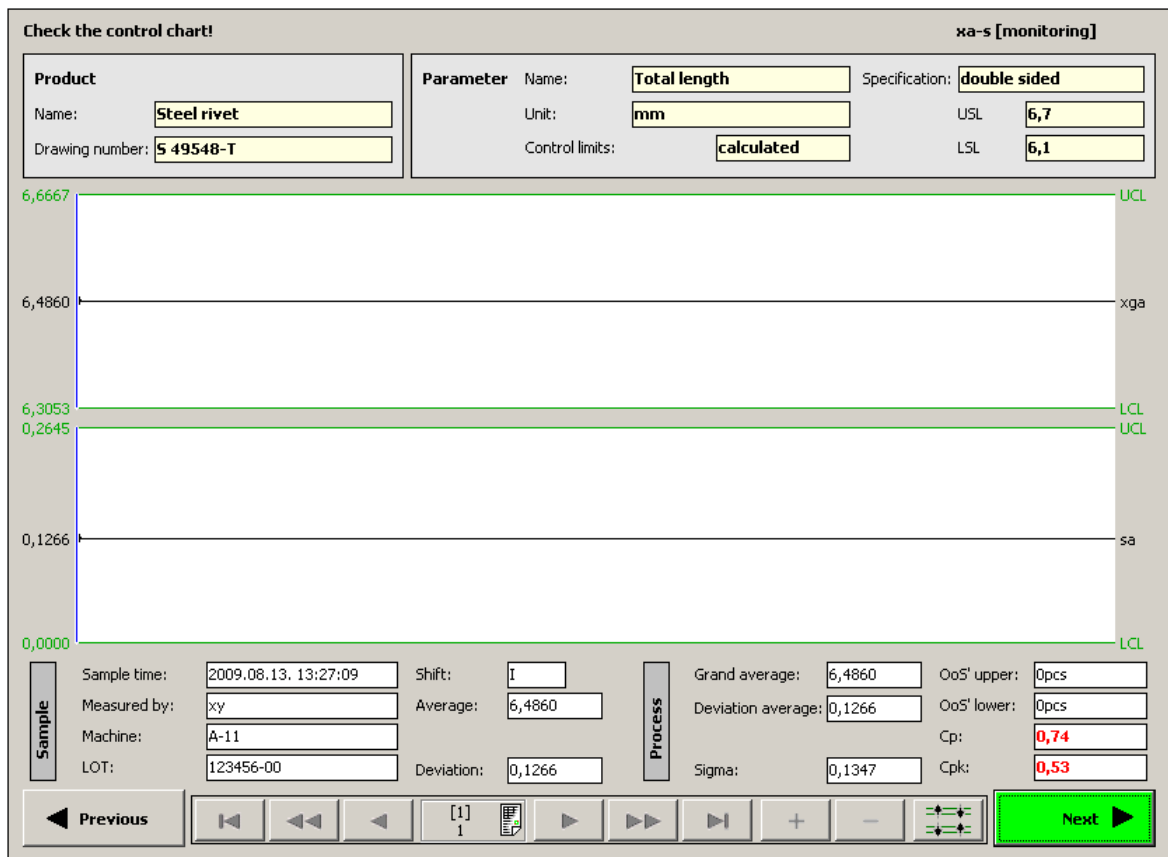
Press the **Next** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

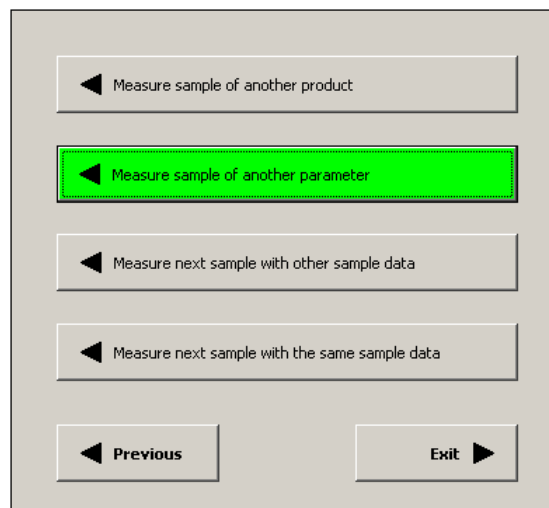
<b>Product</b>		<table border="1"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>6,57</td></tr> <tr><td>2</td><td>6,64</td></tr> <tr><td>3</td><td>6,31</td></tr> <tr><td>4</td><td>6,44</td></tr> <tr><td>5</td><td>6,47</td></tr> </tbody> </table>	No.	Measured value	1	6,57	2	6,64	3	6,31	4	6,44	5	6,47	<div style="text-align: center;">6,47</div>  <div style="text-align: center;">Measure [F12]</div>	 <div style="text-align: center;">Up</div> <div style="text-align: center;">Down</div> <div style="text-align: center;">Save data</div> <div style="text-align: center; background-color: green; color: black; padding: 5px;"><b>Next</b> ▶</div>
No.	Measured value															
1	6,57															
2	6,64															
3	6,31															
4	6,44															
5	6,47															
Name:	Steel rivet															
Drawing number:	5 49548-T															
<b>Parameter</b>																
Name:	Total length															
Unit:	mm															
Specification:	LSL: 6.10 USL: 6.70															
Gauge:	HNS SMUX (Digimatic)															
port	COM1															
channel	0															

◀ Previous Next ▶

The control chart of the *Total length* parameter will be displayed, this window can be closed with the **Next** button.



Press the **Measure sample of another parameter** button, in the displayed window.



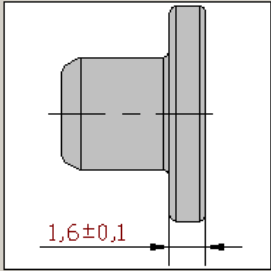
## 5.2 Measuring the head length

Select the *Head length* parameter, and then press the **Next** button, in the displayed window.

**Select parameter to measure!**

Name	Unit	Sample size
Head diameter	mm	5
▶ Head length	mm	5
Stalk diameter	mm	5
Total length	mm	5

Up  
Down



1,6±0,1

◀ Previous Next ▶

Enter the identifiers to record with the sample - likewise for the *Total length* -, and then press the **Next** button, in the displayed window.

**Enter the sample data!**

Sampling time: 2009.08.13. 13:45:43

Machine: A-11  
A-11  
A-12

LOT: 123456-00  
123456-00

Shift: I  
II  
III

Up  
Down

◀ Previous Next ▶

Measure the head length of the first part with the caliper, and then press the **Measure** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

**Product**  
Name: Steel rivet  
Drawing number: 5 49548-T

**Parameter**  
Name: Head length  
Unit: mm  
Specification: LSL: 1.50 USL: 1.70  
Gauge: HNS SMUX (Digimatic)  
port: COM1  
channel: 0

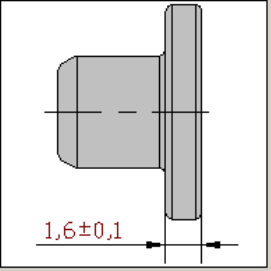
No.	Measured value
▶ 1	
2	
3	
4	
5	

1,58

USL

LSL

Measure [F12]



1,6±0,1

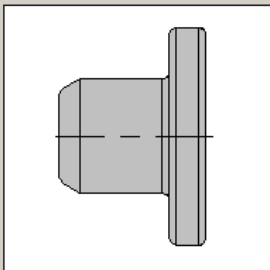
Up  
Down

Save data

◀ Previous Next ▶

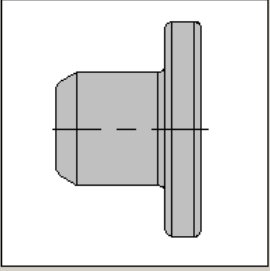
Measure the specified five pieces in all in the same way, and then press the **Save data** button if measured values are not wanted to modify.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

<p><b>Product</b></p> <p>Name: <input type="text" value="Steel rivet"/></p> <p>Drawing number: <input type="text" value="5 49548-T"/></p> <hr/> <p><b>Parameter</b></p> <p>Name: <input type="text" value="Head length"/></p> <p>Unit: <input type="text" value="mm"/></p> <p>Specification: <input type="text" value="LSL: 1.50 USL: 1.70"/></p> <p>Gauge: <input type="text" value="HNS SMUX (Digimatic)"/></p> <p>port: <input type="text" value="COM1"/></p> <p>channel: <input type="text" value="0"/></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>1,58</td></tr> <tr><td>2</td><td>1,65</td></tr> <tr><td>3</td><td>1,62</td></tr> <tr style="background-color: yellow;"><td>4</td><td>1,67</td></tr> <tr style="background-color: yellow;"><td>5</td><td>1,58</td></tr> </tbody> </table>	No.	Measured value	1	1,58	2	1,65	3	1,62	4	1,67	5	1,58	<div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">1,58</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">USL</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">LSL</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">Measure [F12]</div>	 <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="button" value="Up"/> </div> <div style="text-align: center;"> <input type="button" value="Down"/> </div> <div style="text-align: center;"> <input style="background-color: green; color: black;" type="button" value="Save data"/> </div> </div>
No.	Measured value														
1	1,58														
2	1,65														
3	1,62														
4	1,67														
5	1,58														

Press the **Next** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

<p><b>Product</b></p> <p>Name: <input type="text" value="Steel rivet"/></p> <p>Drawing number: <input type="text" value="5 49548-T"/></p> <hr/> <p><b>Parameter</b></p> <p>Name: <input type="text" value="Head length"/></p> <p>Unit: <input type="text" value="mm"/></p> <p>Specification: <input type="text" value="LSL: 1.50 USL: 1.70"/></p> <p>Gauge: <input type="text" value="HNS SMUX (Digimatic)"/></p> <p>port: <input type="text" value="COM1"/></p> <p>channel: <input type="text" value="0"/></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>1,58</td></tr> <tr><td>2</td><td>1,65</td></tr> <tr><td>3</td><td>1,62</td></tr> <tr style="background-color: yellow;"><td>4</td><td>1,67</td></tr> <tr style="background-color: yellow;"><td>5</td><td>1,58</td></tr> </tbody> </table>	No.	Measured value	1	1,58	2	1,65	3	1,62	4	1,67	5	1,58	<div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">1,58</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">USL</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">LSL</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">Measure [F12]</div>	 <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <input type="button" value="Up"/> </div> <div style="text-align: center;"> <input type="button" value="Down"/> </div> <div style="text-align: center;"> <input style="background-color: gray; color: gray;" type="button" value="Save data"/> </div> </div>
No.	Measured value														
1	1,58														
2	1,65														
3	1,62														
4	1,67														
5	1,58														



### 5.3 Measuring the head diameter

Select the *Head diameter* parameter, and then press the **Next** button, in the displayed window.

**Select parameter to measure!**

Name	Unit	Sample size
▶ <b>Head diameter</b>	mm	5
Head length	mm	5
Stalk diameter	mm	5
Total length	mm	5

Up  
Down

◀ Previous Next ▶

Enter the identifiers to record with the sample - likewise for the *Total length* -, and then press the **Next** button, in the displayed window.

**Enter the sample data!**

Sampling time: 2009.08.13. 14:01:44      Machine: A-11      LOT: 123456-00

Shift: I      A-11      123456-00  
 II      A-12      123456-00  
 III

Up      Up      Up  
 Down      Down      Down

◀ Previous Next ▶

Measure the head diameter of the first part with the micrometer, and then press the **Measure** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

**Product**

Name:

Drawing number:

No.	Measured value
▶ 1	
2	
3	
4	
5	

**9,805**

USL

LSL

**Measure [F12]**

Up  
Down

Save data

◀ Previous Next ▶

Measure the specified five pieces in all in the same way, and then press the **Save data** button if measured values are not wanted to modify.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

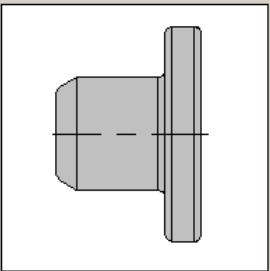
No.	Measured value
1	9,805
2	9,684
3	9,725
4	9,601
5	9,663

**Product**  
 Name:   
 Drawing number:

**Parameter**  
 Name:   
 Unit:   
 Specification:   
 Gauge:   
 port:   
 channel:

9,663  
 USL  
 LSL  
 Measure [F12]

Up  
 Down  
 Save data  
 Previous  
 Next



Press the **Next** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

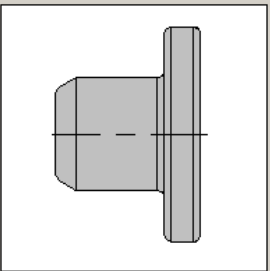
No.	Measured value
1	9,805
2	9,684
3	9,725
4	9,601
5	9,663

**Product**  
 Name:   
 Drawing number:

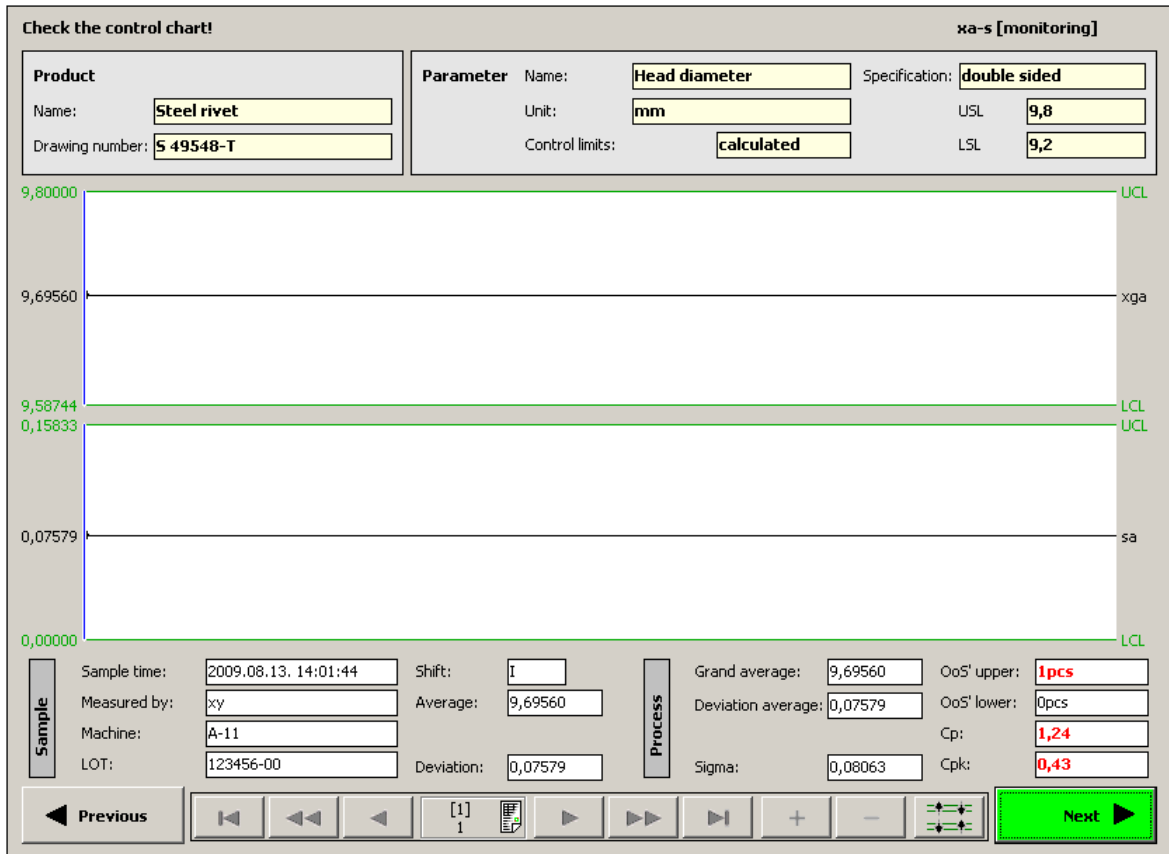
**Parameter**  
 Name:   
 Unit:   
 Specification:   
 Gauge:   
 port:   
 channel:

9,663  
 USL  
 LSL  
 Measure [F12]

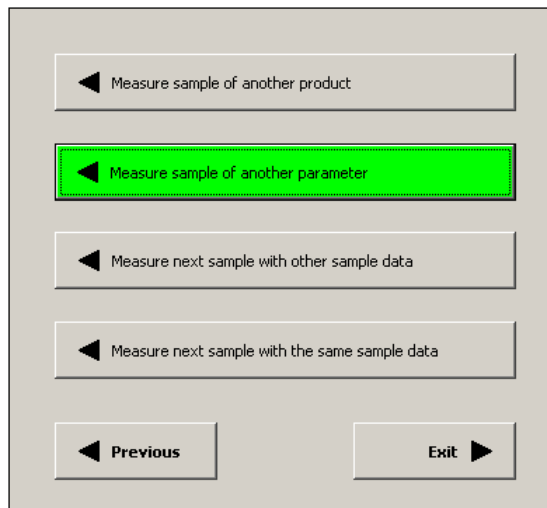
Up  
 Down  
 Save data  
 Previous  
 Next



The control chart of the *Head diameter* parameter will be displayed, this window can be closed with the **Next** button.



Press the **Measure sample of another parameter** button, in the displayed window.



## 5.4 Measuring the stalk diameter

Select the *Stalk diameter* parameter, and then press the **Next** button, in the displayed window.

**Select parameter to measure!**

Name	Unit	Sample size
Head diameter	mm	5
Head length	mm	5
▶ Stalk diameter	mm	5
Total length	mm	5

Enter the identifiers to record with the sample - likewise for the *Total length* -, and then press the **Next** button, in the displayed window.

**Enter the sample data!**

Sampling time:  
2009.08.13. 14:44:44

Shift:  
I  
II  
III

Machine:  
A-11  
A-12

LOT:  
123456-00  
123456-00

Measure the stalk diameter of the first part with the micrometer, and then press the **Measure** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

**Product**

Name:

Drawing number:

**Parameter**

Name:

Unit:

Specification:

Gauge:

port:

channel:

No.	Measured value
▶ 1	
2	
3	
4	
5	

4,914

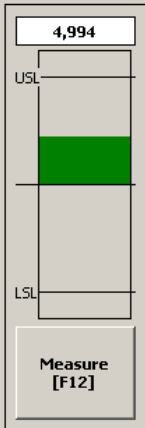
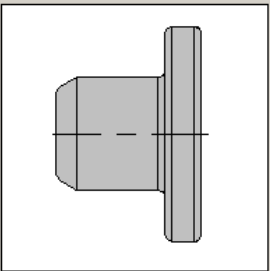
USL

LSL

**Measure [F12]**

Measure the specified five pieces in all in the same way, and then press the **Save data** button if measured values are not wanted to modify.

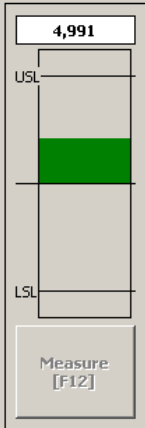
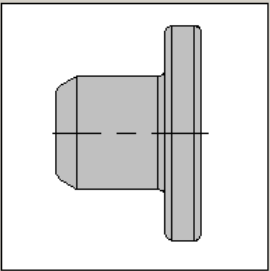
**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

<b>Product</b>		<table border="1"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>4,914</td></tr> <tr><td>2</td><td>4,909</td></tr> <tr><td>3</td><td>4,956</td></tr> <tr><td>4</td><td>4,938</td></tr> <tr><td>5</td><td>4,994</td></tr> </tbody> </table>	No.	Measured value	1	4,914	2	4,909	3	4,956	4	4,938	5	4,994	<div style="text-align: center;">4,994</div>  <div style="text-align: center;">Measure [F12]</div>	 <div style="text-align: center;">Up</div> <div style="text-align: center;">Down</div> <div style="text-align: center; background-color: green; color: black; padding: 5px;"><b>Save data</b></div>
No.	Measured value															
1	4,914															
2	4,909															
3	4,956															
4	4,938															
5	4,994															
Name:	Steel rivet															
Drawing number:	5 49548-T															
<b>Parameter</b>																
Name:	Stalk diameter															
Unit:	mm															
Specification:	LSL: 4.850 USL: 5.050															
Gauge:	HNS SMUX (Digimatic)															
port	COM1															
channel	1															

◀ Previous Next ▶

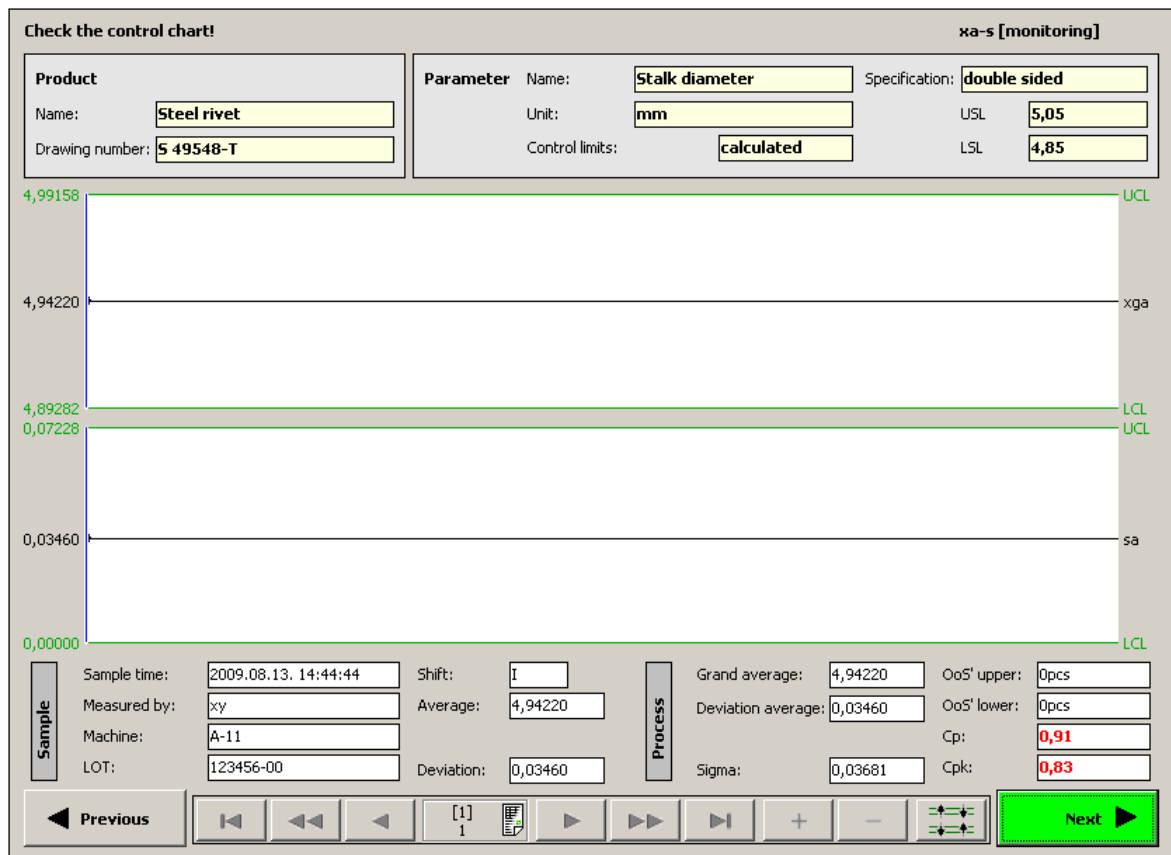
Press the **Next** button.

**Measure the pieces of the sample and input measured values by keyboard or by gauge directly!**

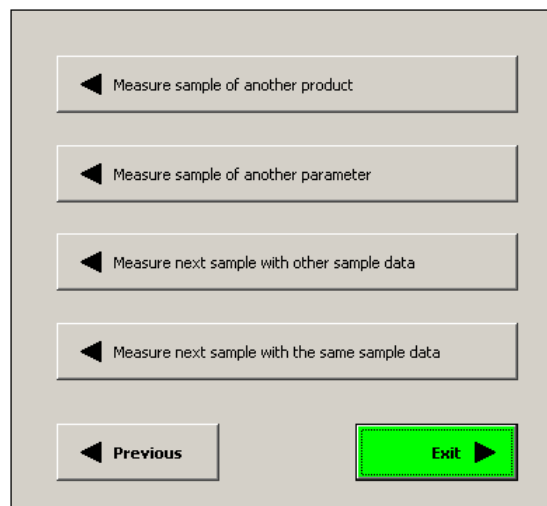
<b>Product</b>		<table border="1"> <thead> <tr> <th>No.</th> <th>Measured value</th> </tr> </thead> <tbody> <tr><td>1</td><td>4,914</td></tr> <tr><td>2</td><td>4,909</td></tr> <tr><td>3</td><td>4,956</td></tr> <tr><td>4</td><td>4,938</td></tr> <tr><td>5</td><td>4,994</td></tr> </tbody> </table>	No.	Measured value	1	4,914	2	4,909	3	4,956	4	4,938	5	4,994	<div style="text-align: center;">4,991</div>  <div style="text-align: center;">Measure [F12]</div>	 <div style="text-align: center;">Up</div> <div style="text-align: center;">Down</div> <div style="text-align: center;">Save data</div> <div style="text-align: center; background-color: green; color: black; padding: 5px;"><b>Next</b> ▶</div>
No.	Measured value															
1	4,914															
2	4,909															
3	4,956															
4	4,938															
5	4,994															
Name:	Steel rivet															
Drawing number:	5 49548-T															
<b>Parameter</b>																
Name:	Stalk diameter															
Unit:	mm															
Specification:	LSL: 4.850 USL: 5.050															
Gauge:	HNS SMUX (Digimatic)															
port	COM1															
channel	1															

◀ Previous Next ▶

The control chart of the *Stalk diameter* parameter will be displayed, this window can be closed with the **Next** button.



All of the parameters specified in the control plan have been measured, so go back into the main window with the **Exit** button.



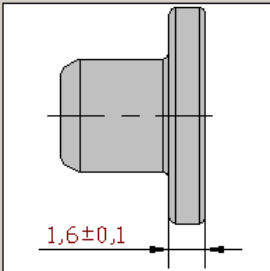
## 6 Analysis

### 6.1 Select the data

Choose the **Analysis** menu item of the main menu, and then the **Select data** menu item of the sub-menu.

Select the product and parameter to be analysed, in the displayed window. After this, select the sample range to be analysed, this can be the samples of the last control chart or the samples recorded during an optional time range, sorted by sample identifiers optionally.

**Select sample range to analyse!**

Product:	Drawing number: <input type="text" value="S 49548-T"/>	
<input type="text" value="Steel rivet"/>	Description: Material: Q5t 36-2 Weight: 1,6 gr / pc	
Parameter:	Specification: <input type="text" value="double sided"/>	Chart size: <input type="text" value="25"/>
<input type="text" value="Head length"/>	USL: <input type="text" value="1,7"/> mm	Kind of chart: <input type="text" value="x-s"/>
	LSL: <input type="text" value="1,5"/> mm	Chart type: <input type="text" value="monitoring"/>

Automatic sample range selection (select samples of the last control chart)  
 Select sample range by beginning and closing time

Beginning time:

Closing time:

Load data

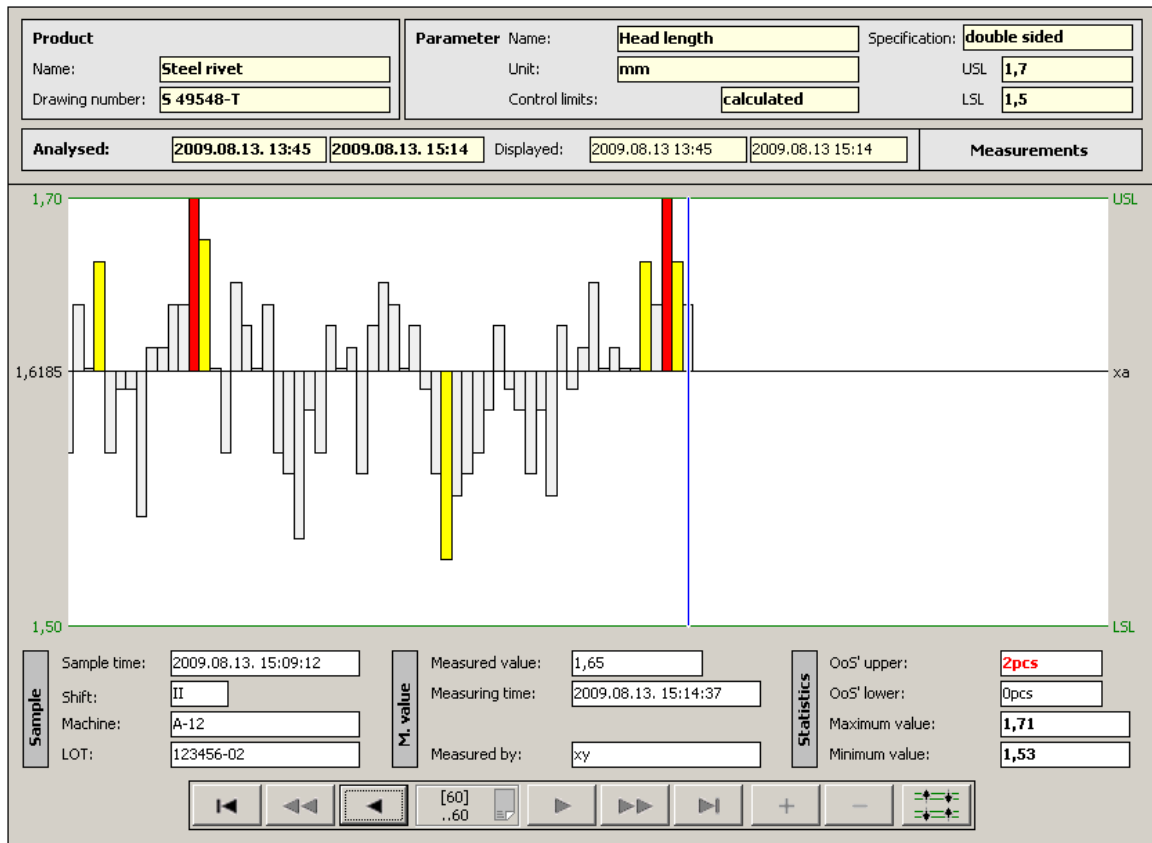
Filter options	Operator:	Shift:	Machine:	LOT:
	<input type="text" value="xy"/>	<input type="text" value="I"/> <input type="text" value="II"/>	<input type="text" value="A-11"/> <input type="text" value="A-12"/>	<input type="text" value="123456-00"/> <input type="text" value="123456-02"/> <input type="text" value="123456-04"/> <input type="text" value="123456-06"/> <input type="text" value="123456-07"/>

If the data is loaded, number of samples and measured values will be displayed in the status row.

Loading is completed, number of samples: 12, number of measured values: 60.

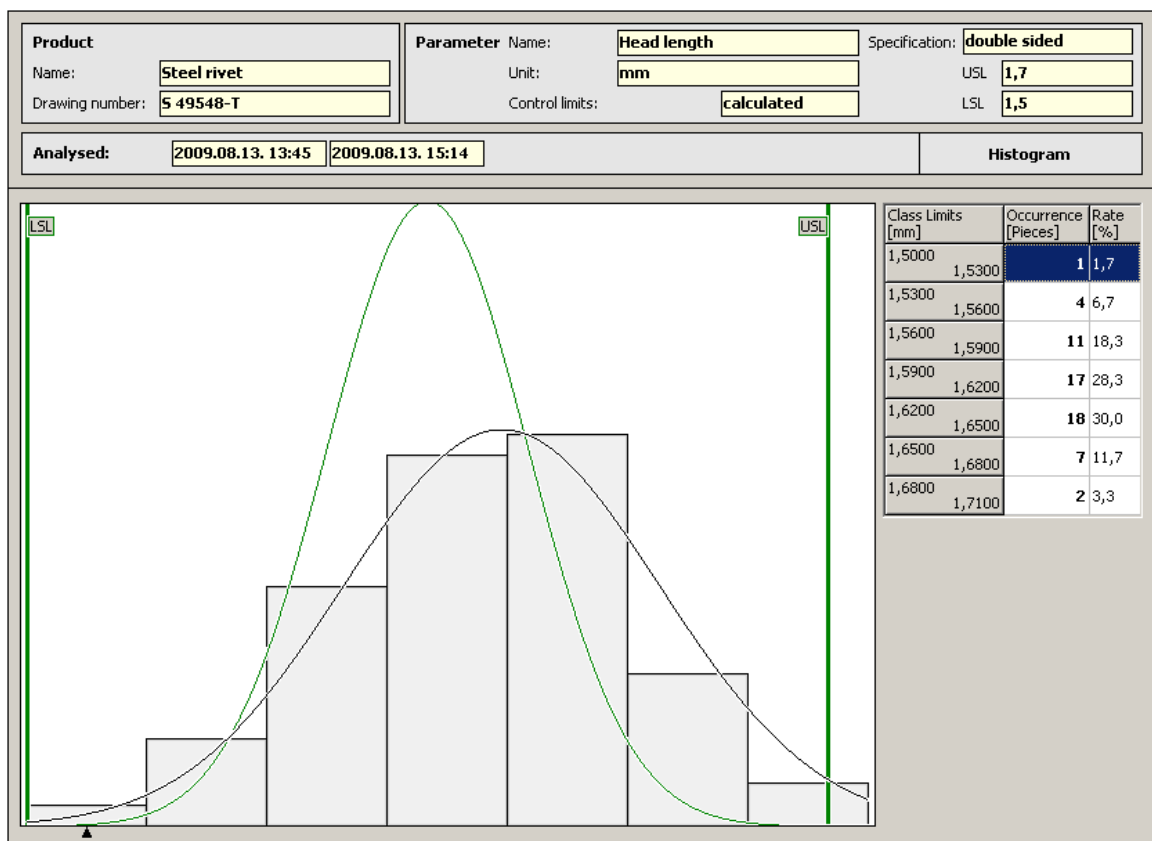
## 6.2 Value chart

Choose the **Value chart** menu item of the sub-menu after selecting the data.



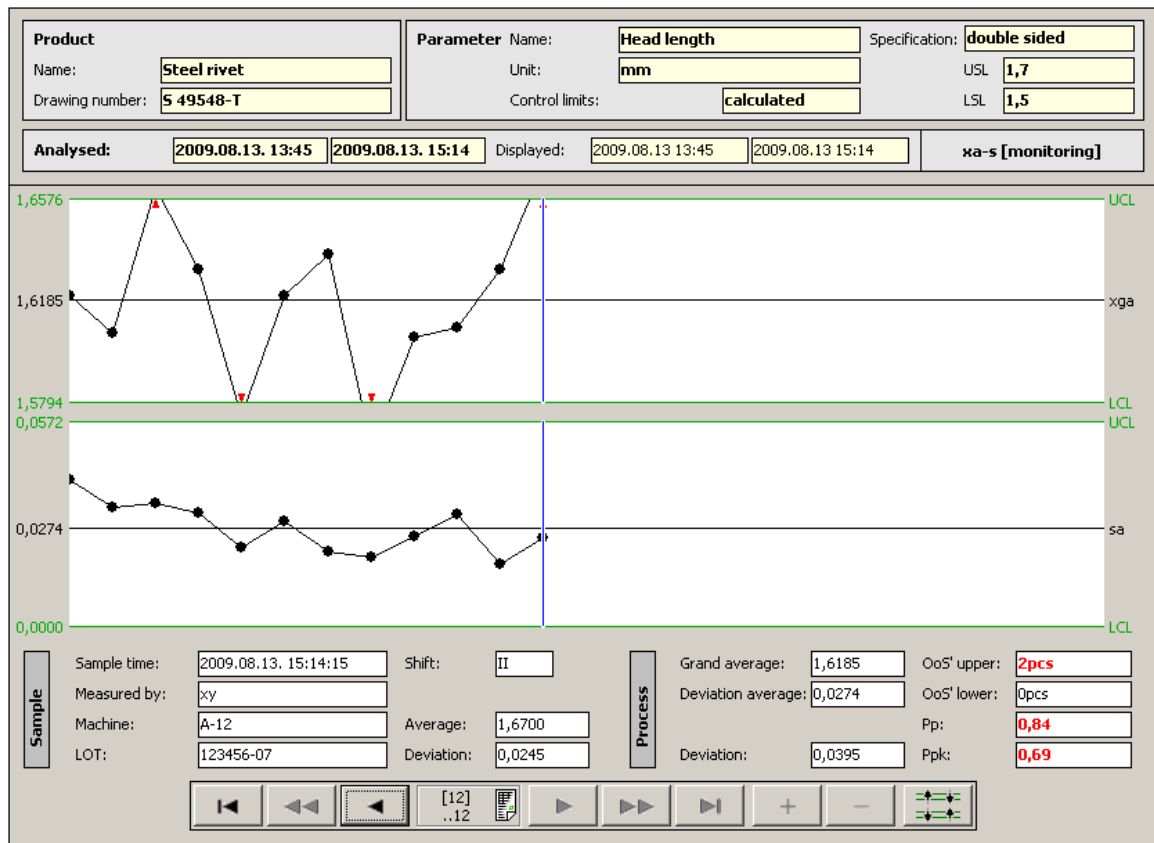
## 6.3 Histogram

Choose the **Histogram** menu item of the sub-menu after selecting the data.

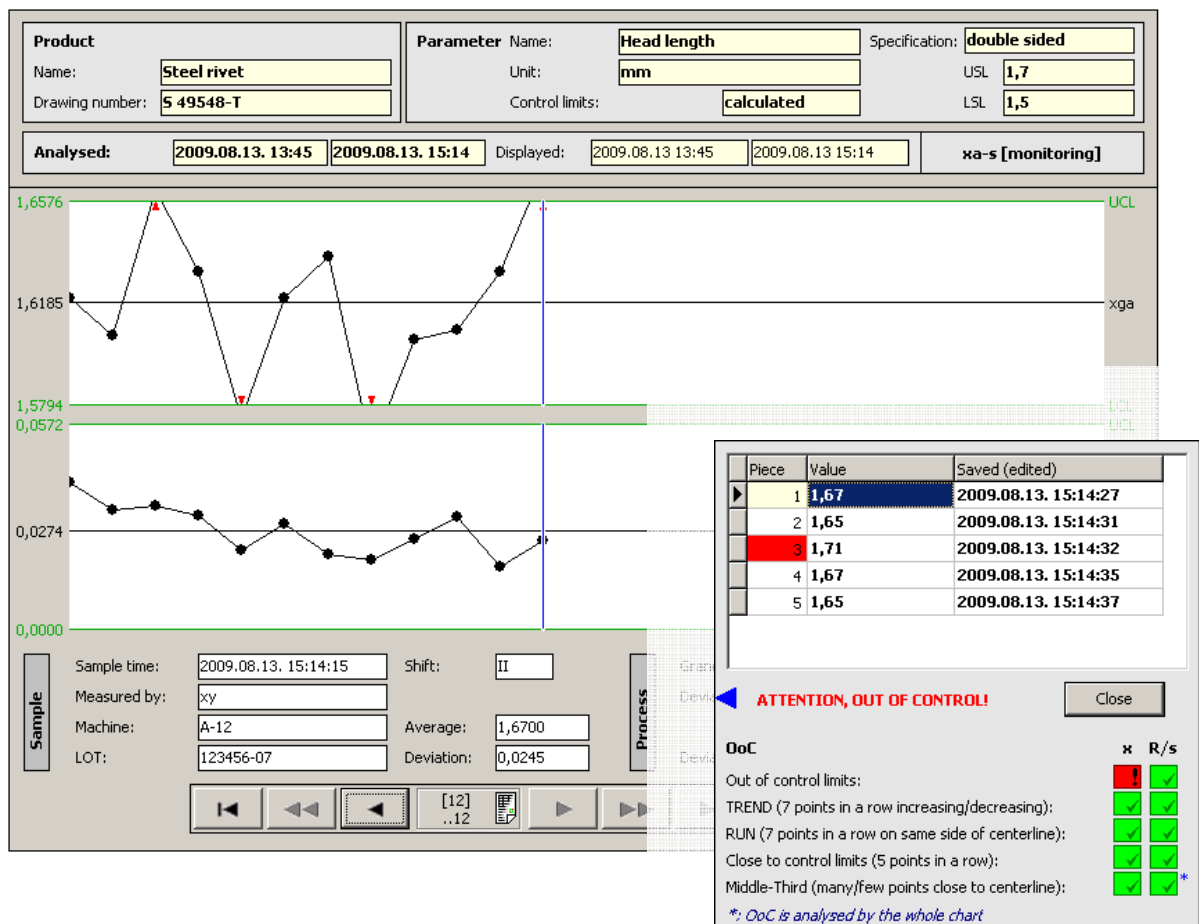


## 6.4 Control chart

Choose the **Control chart** menu item of the sub-menu after selecting the data.



It is possible to display the measured values of the appointed sample.



## 6.5 Process overview

Choose the **Overview** menu item of the main menu, and then the **Process states** menu item of the sub-menu.

**Processes:**

- [-] Steel rivet
  - Head diameter
  - Head length
  - Stalk diameter
  - Total length

Unit:	<input type="text"/>	Control chart:	<input type="text" value="xa-R"/> <input type="text" value="monitoring"/>
Specification:	<input type="text" value="double sided"/>	Control limits:	<input type="text" value="calculated"/>
UCL	<input type="text" value="0"/>	UCL, LCL (x)	<input type="text" value="1,6576"/> <input type="text" value="1,5794"/>
LSL	<input type="text" value="0"/>	UCL, LCL (R/s)	<input type="text" value="0,0572"/> <input type="text" value="0,0000"/>

**Data of last sample**

Last sampling time:	<input type="text" value="2009.08.13. 15:14:15"/>	Sample average:	<input type="text" value="1,6700"/>
Measured by:	<input type="text" value="xy"/>	Sample range:	<input type="text" value="0,06"/>
Shift:	<input type="text" value="II"/>	Sample deviation:	<input type="text" value="0,0245"/>
Machine:	<input type="text" value="A-12"/>	Sample OoC status:	<input type="text" value="OoC!"/>
LOT:	<input type="text" value="123456-07"/>		

**Data of last control chart**

Time range:		<input type="text" value="2009.08.13. 13:45:43"/>	-	<input type="text" value="2009.08.13. 15:14:15"/>
Maximum value:	<input type="text" value="1,71"/>	xa/xga	<input type="text" value="1,6185"/>	<input type="text" value="1,6185"/>
Minimum value:	<input type="text" value="1,53"/>	R/Ra	<input type="text" value="0,18"/>	<input type="text" value="0,0683"/>
OoS' upper:	<input type="text" value="2"/>	s/sa	<input type="text" value="0,0395"/>	<input type="text" value="0,0274"/>
OoS' lower:	<input type="text" value="0"/>	Sigma (estimated deviation):	<input type="text" value="---"/>	
Process state:	<input type="text" value="NOT stable!"/>			

**Process capability data**

Pp:	<input type="text" value="0,84"/>	Cp:	<input type="text" value="---"/>
Ppk:	<input type="text" value="0,69"/>	Cpk:	<input type="text" value="---"/>

## 6.6 Product pareto analysis

Choose the **Overview** menu item of the main menu, and then the **Product pareto** menu item of the sub-menu.

Product name

- ▶ Steel rivet

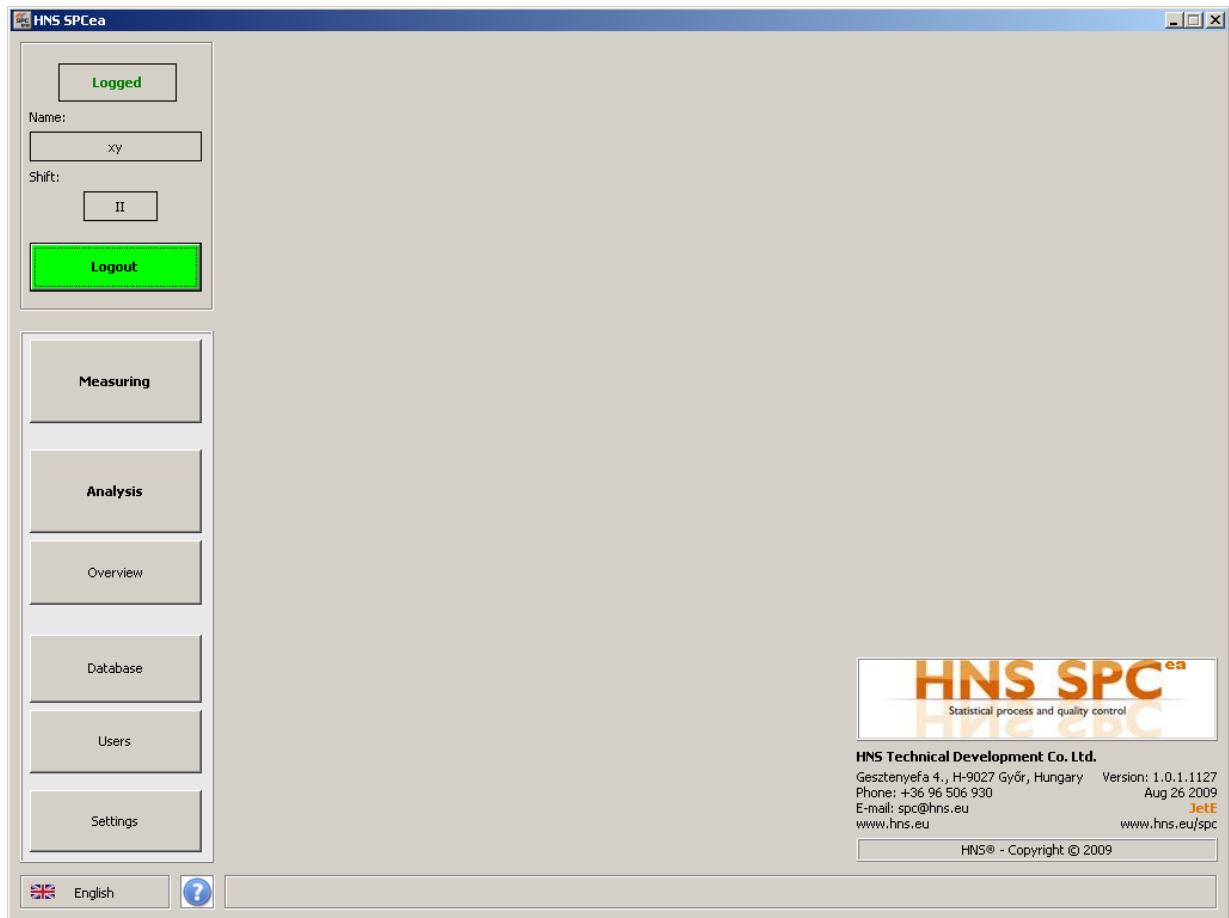
Analysed:  -


Parameter name	Defects
▶ Head length	2
Head diameter	1
Total length	1

Measurements:	<input type="text" value="60 pcs"/>
OoS' upper:	<input type="text" value="2 pcs"/>
OoS' lower:	<input type="text" value="0 pcs"/>

## 7 Exit from the program

Log out from the program with the **Logout** button.



The program can be closed by the usual way, by pressing the  button in the right-upper corner of the window (program can be closed at anytime, without logout).