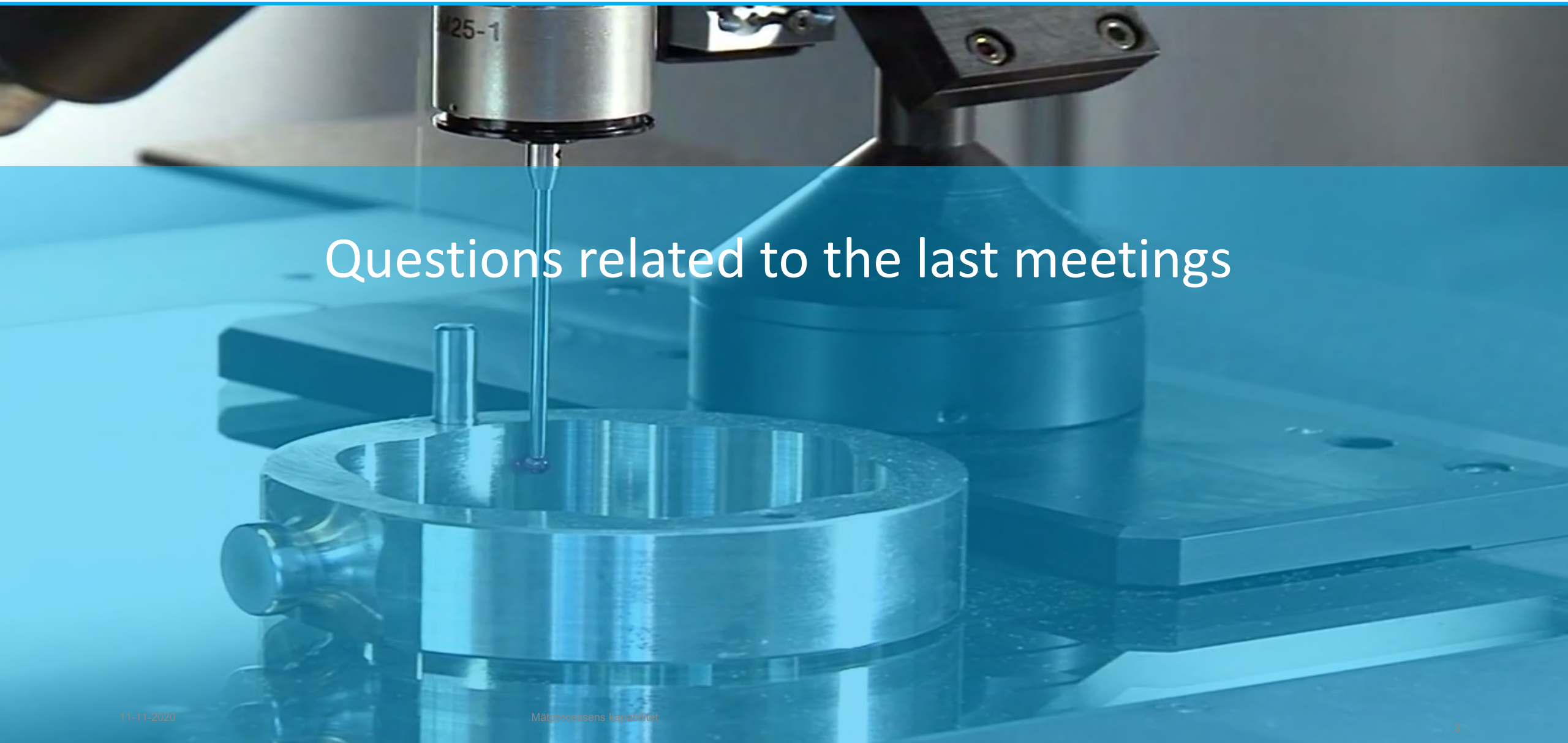
Q-DAS Erfa group

Meeting 59

Teams meeting nov 2020

Agenda

- Questions from last meeting
- News about Metrology and Statistics from Denmark and abroad
- Generel information
  - Information on validation of the calculations in procella
- Data collection with procella
  - Use of additional data in connection with the data collection
- Creation and use of control plans (Test plans)
- Using SPC during data collection



Questions related to the last meetings

News about Metrology and Statistics from Denmark, Sweden and abroad

ISO standards TC 69

New Standards published

- ISO/TR 22914:2020
- Statistical methods for implementation of Six Sigma — Selected illustration of analysis of variance

Under development

- ISO/DIS 16355-1
- Application of statistical and related methods to new technology and product development process — Part 1: General principles and perspectives of Quality Function Deployment (QFD
- ISO/DIS 16337
- Application of statistical and related methods to new technology and product development process — Robust Tolerance Design (RTD)
- ISO/DIS 13528
- Statistical methods for use in proficiency testing by interlaboratory comparison

ISO Standards TC 213

- 150 standards published and a number under development under development
- ISO/DIS 2692
- Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)
- ISO/DIS 8062-3
- Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 3: General dimensional and geometrical tolerances and machining allowances for castings
- ISO/DIS 8062-4
- Geometrical product specifications — Dimensional and geometrical tolerances for moulded parts — Part 4: Rules and general tolerances for castings using profile tolerancing in a general datum system
- ISO/DIS 10360-10
- Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring systems (CMS) — Part 10: Laser trackers

ISO Standards TC 213

- **ISO/DIS 10360-13**
- Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring systems (CMS) — Part 13: Optical 3D CMS
- **ISO/DIS 12179**
- Geometrical product specifications (GPS) — Surface texture: Profile method — Calibration of contact (stylus) instruments
- **ISO/DIS 21920-1**
- Geometrical product specifications (GPS) — Surface texture: Profile — Part 1: Indication of surface texture
- **ISO/DIS 21920-2**
- Geometrical product specifications (GPS) — Surface texture: Profile — Part 2: Terms, definitions and surface texture parameters
- **ISO/FDIS 22081**
- Geometrical product specifications (GPS) — Geometrical tolerancing — General geometrical specifications and general size specifications

New version of VDA 5

- Members in VDA 5

Zusammensetzung Arbeitskreis VDA Band 5

Mitglieder im Arbeitskreis (Stand: 16.09.2020)

Dr. Babl	Christian	Continental Automotive GmbH
Conrad	Stephan	Hexagon (Q-DAS GmbH)
Gahlen	Thomas	ZF Friedrichshafen AG
Dr. Gerhorst	Frank	Ford-Werke GmbH
Heitzer	Rainer	BMW AG
Hoffmann	Marcus	AUDI AG (AK-Leitung)
Hoppe	Mario	BMW Motorrad
Koch	Thomas	Volkswagen AG
Malek	Branko	AUDI AG
Matousek	Stepan	Schaeffler
Ofen	Rolf	IO-MQS
Schardt	Christoph	Volkswagen AG
Dr. Schultz	Wolfgang	Hexagon (Q-DAS GmbH)
Steuber	Ulf	Volkswagen AG
Weiss	Manfred	Webasto SE
Wötzel	Marco	Daimler AG

Unterstützung durch:

Wang	Wei Min	TU Berlin
Müller-Ott	Teresa	VDA QMC

VDA | QMC
Qualitäts Management Center

Webasto
DAIMLER
Ford
Rolls-Royce
Motor Cars Limited
SCHAEFFLER
ZF
Continental
Ingenieurbüro Ofen
IO-MQS
HEXAGON
Q-DAS

Umgesetzte neue Struktur VDA Band 5

Aufteilung in Hauptband und Praxishandbuch erhöht Anwendbarkeit

VDA | QMC
Qualitäts Management Center im Verband der Automobilindustrie

Praxishandbuch
Beispiele und Anwendungsfälle

z.B.
- Risikogerechte Absicherung
  - Klassierung
  - Fine Tolerances
  - CT-Prüfung
  - Attributive Prüfung

Qualifizierungs-konzept

- Training / Schulung Anwender
- Auditierung / Qualifizierung Auditoren

- Roter Faden im Hauptband bietet den Anwendern Orientierung
- Praxishandbuch zeigt Umsetzung in Beispielen
- Wissenstransfer über Trainingskonzept für Anwender und Auditoren sichergestellt

VDA 5

Unique selling points (USP) des VDA Bands 5

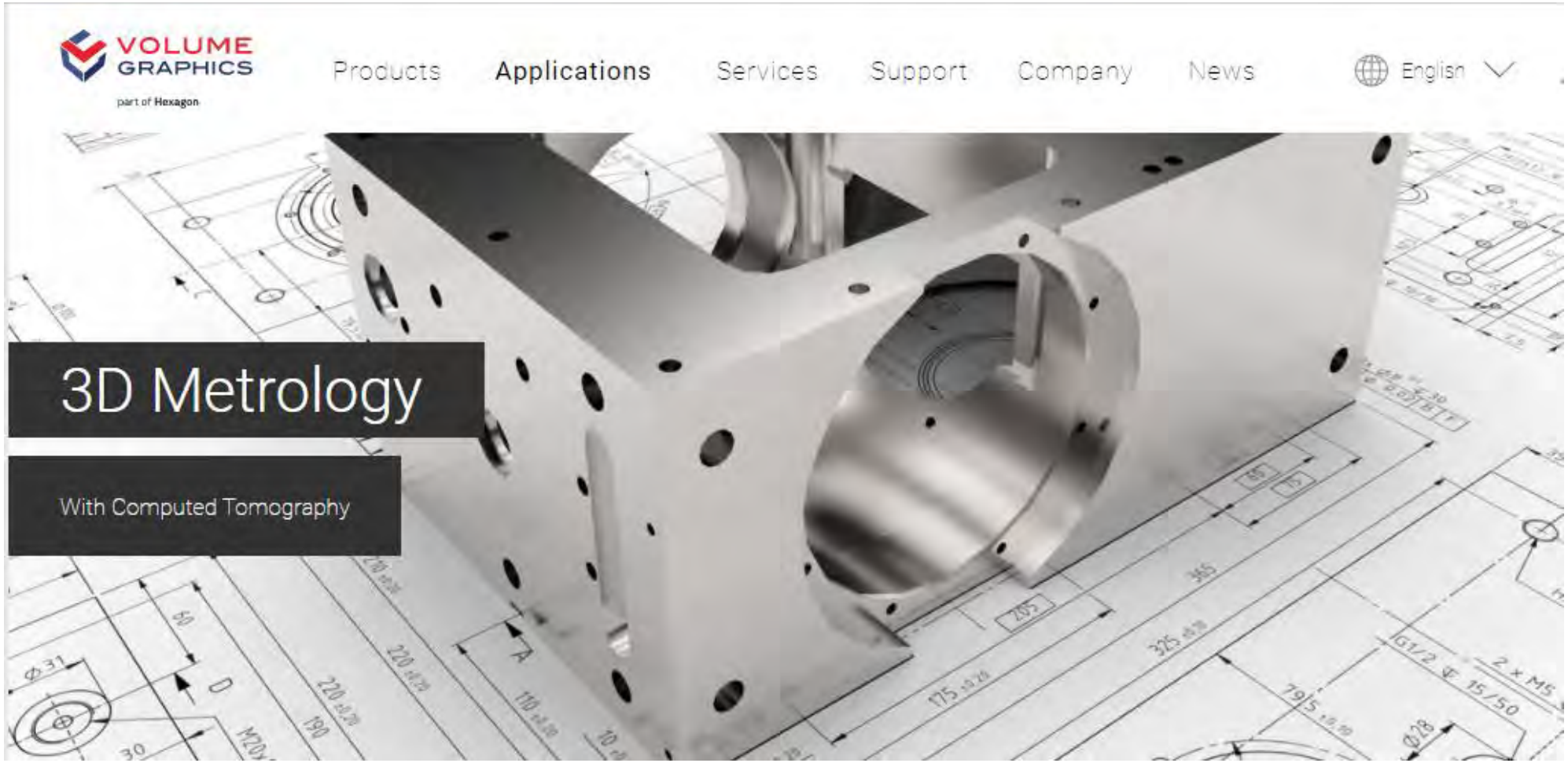
Umgang mit nicht geeigneten Messsystemen /-prozessen

VDA | QMC
Qualifiziertes Management Center

- Optimierung der Mess- und Prüfprozesse
- Risikoanalyse und temporäre Freigabe
- Berücksichtigung der Messunsicherheit an den Spezifikationsgrenzen
- Reflexion und ggf. Anpassung der Grenzwerte und Toleranzen
- FT-Regelung für Messprozesse mit kleinen Toleranzen
- Verringerung der Messunsicherheit durch Mehrfachmessung
- Absprache mit Kunden

News from Q - DAS

Volume Graphics now a part of Hexagon
Cooperation with Q-DAS



Newest versions of Q-DAS products

- The present version 12 is 12.0.3.1

- The present version 13 is 13.0.1.5

- Q-DAS IMC version 2-released
- Intelligent monitoring and control of the production process
- The new version of Q-DAS IMC intelligent machine control software establishes a link between tool data and measured values and enables clear communication between machine tools and the database with additional controllers.

- NEW RELEASE Q-DAS eMMA 3.2.0
- Faster and improved analysis of 3D measurement data

Changes V13

Minimum 48 change’s in the software from 13.0.1.5 to 13.0.2.0.1

Most important

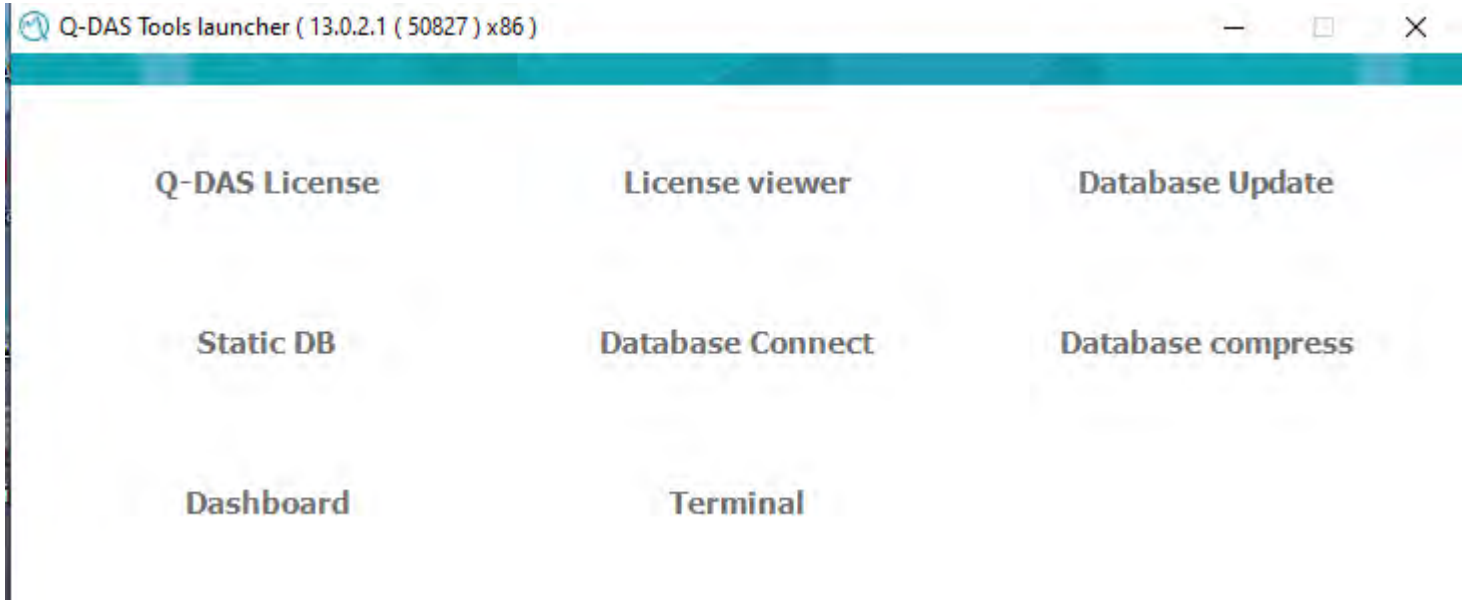
- The window bar to maximize /Minimizing was for graphics in maximized condition 3-times available.
- As soon as the measured value acquisition over an interface occurs, the notes in the graphics no longer shown.
- Fixed update problem when integrating a parts protocol into the measured value logging.
- Incorrect behavior while filtering the weekdays with the "time/date" filter function. - Error corrected
- The graphic "Individual values all characteristics rotated "was not shown when the first characteristic was an attributive feature. –Error corrected
- When using a filter combination (complex filter) with the conditions "last X measured values or last complete time", and not sufficient measured values present the measured values from time unit before war reloaded. However, all measurements were loaded in reverse chronological order. - Error corrected
- The option "Common additional data fields “ In Procella had no function if the dialog "Additional data” was opened in the middle of the measurement sequence. -Error corrected
- The Q-DM (Upload) option "Measured values update based on “ does not function together with the additional data field "K0056".

Changes V13

- The filtering by overall evaluation of characteristics for "Total Capability Indices" graphics was modified.
- Deactivating the VALUE GUID in the additional data set has the effect that records from the database could no longer be saved. Since this is a wanted state, the configurator will now when creating such a set be informed. Furthermore, in the "Read from database" dialog indicated that it is a read-only mode for that reason.
- Confirming a measurement in CMM reporting was synchronized with the upload cycle, measurements were not timely approved, but first approved at the next upload cycle – corrected
- The font size of the selected data or additional data to be written did not respond to the set Font size for the dialog. –Error corrected

New functions in V13

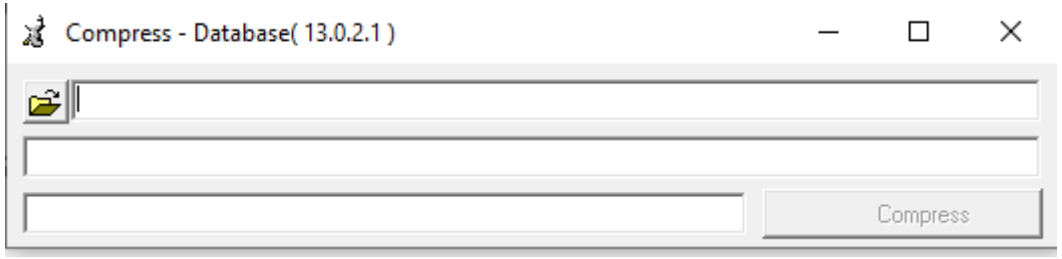
- Tool Launcher
- Update of databases
- License viewer
- Static DB – Database creation
- License - changes licenses
- Database connections - tools
- Access databases repair
- Dashboard
- Terminal



Special functions

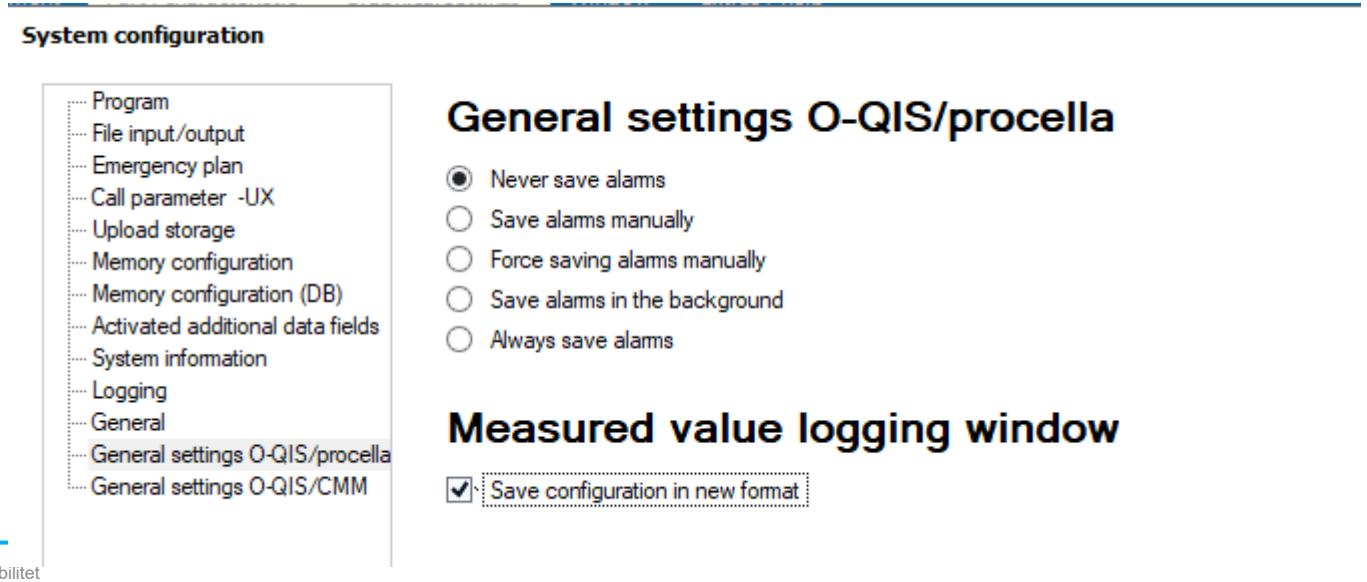
- Dashboards
  - Configuration of uploads
  - Edit catalogs
  - Log file settings – alarms logging

Compress Access databases



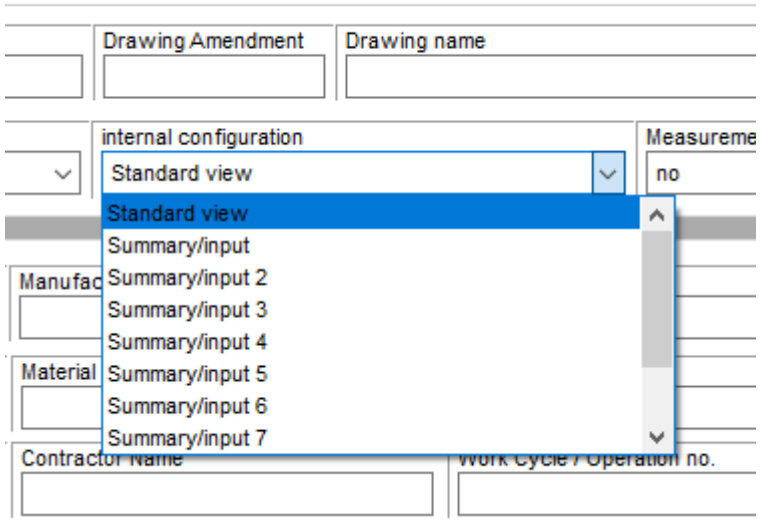
New function

- Solution on the problems about ”measured value loggin”.
- With the new version V13 (Release 13.0.2.1) the new storage concept for Q-DAS Procella is activated by default in new installations (in the configuration database).
- As soon as the configuration user not only has exactly one layout for the whole company things got more complicated because different measuring stations or departments required then different configurations.
- The cause is in the configuration of the data sets, the graphical user interface and the requirement for looking for special measuring methods.



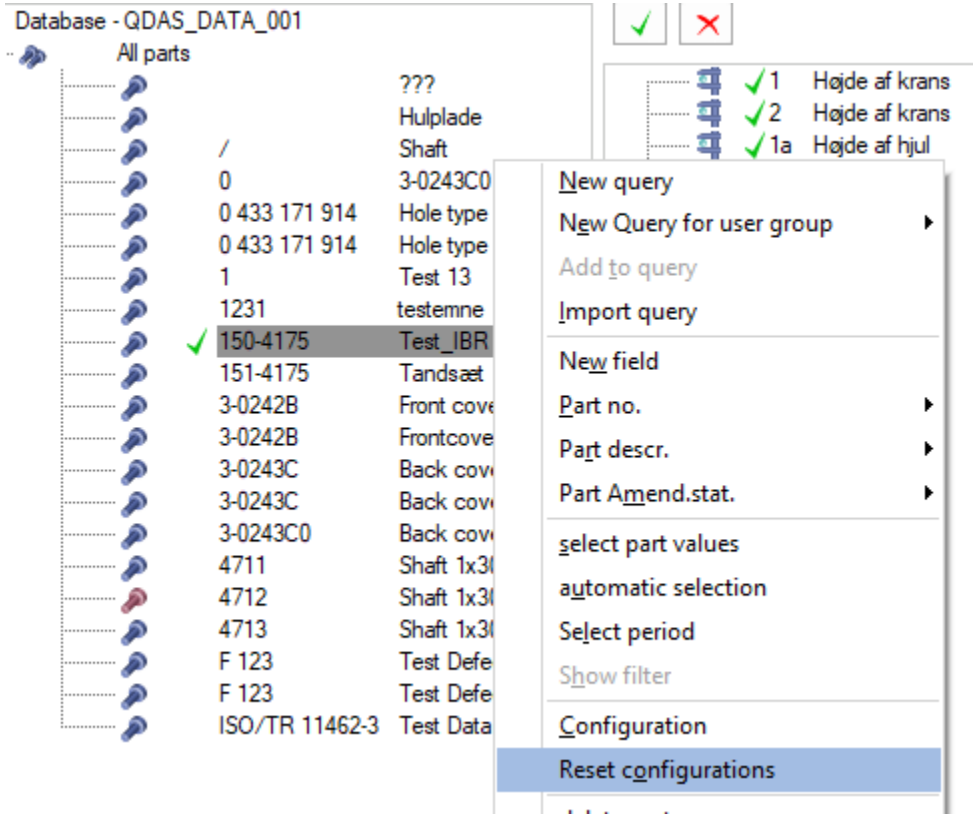
New Functions

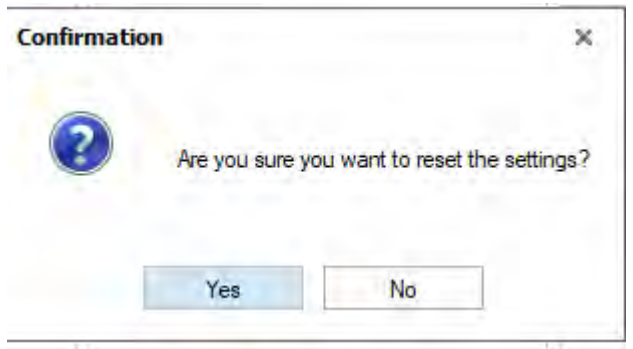
- New controlplan
- Part mask definition
  - Choose the layout



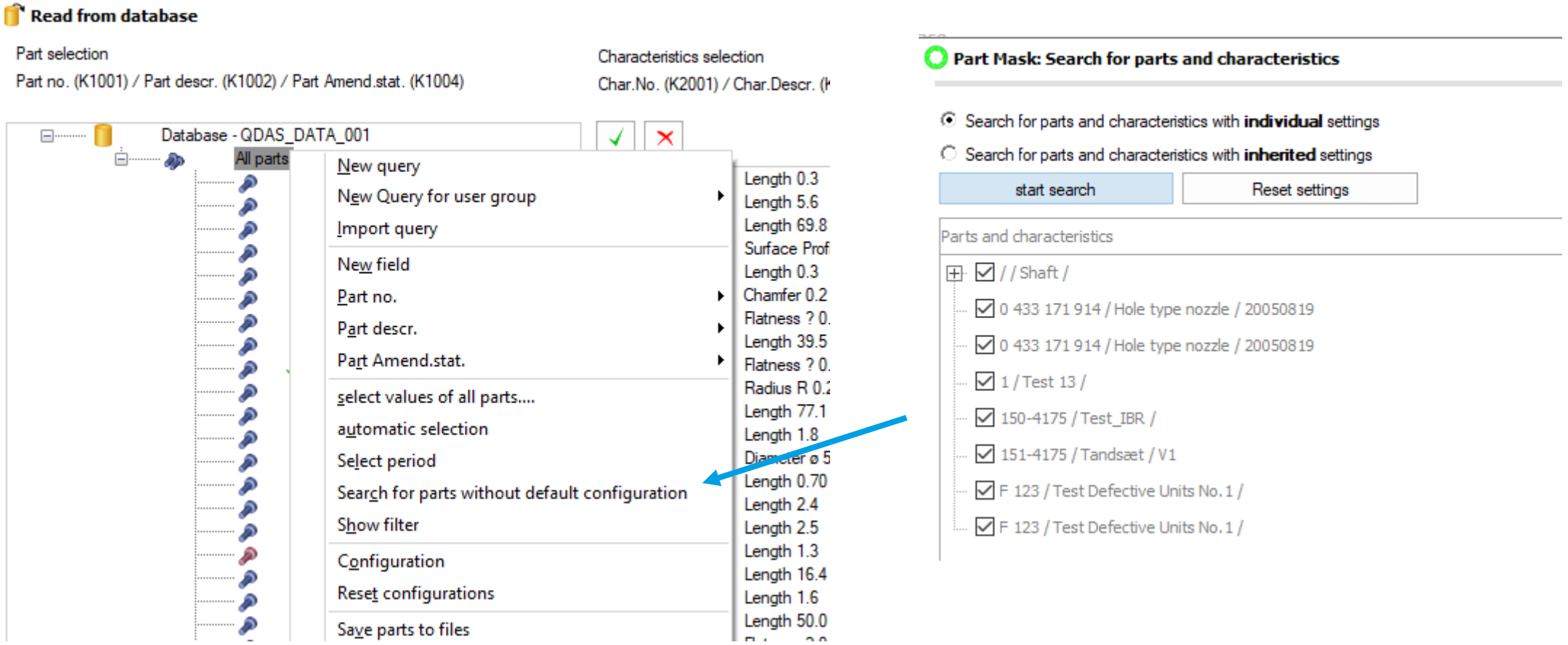
New function

- Reset layout



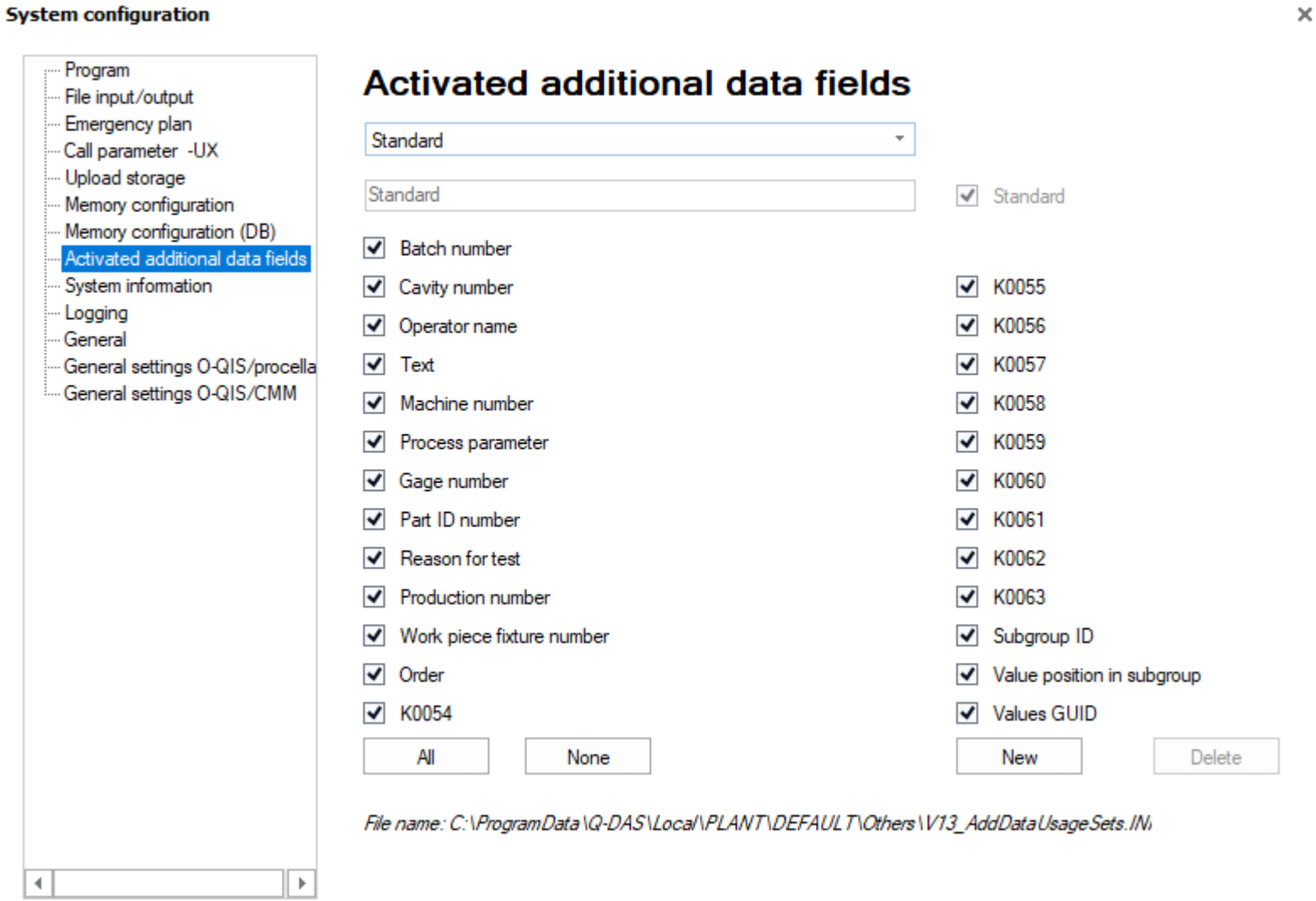


New function



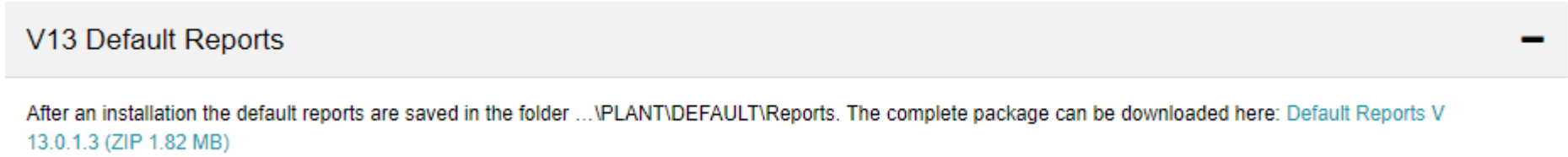
New function

- Definition of additional data



Q-DAS standard reports

- You can download the Q-DAS reports V13 and use them also in V12
- https://www.q-das.com/en/service/support-hotline#faqs|||



- We can have them on our homepage also.
- Your special reports?
- Your strategy?

Reports

- New reports with the CAD version

Metrologic CalibWeb

Measurement Equipment Calibration management

Measurement Equipment Information

METROLOGIC

Back Logout

Documment Information | Meas. Ranges | Accessories | History | Use Log

Instrument Info

Instrumt No	0-3.4		
Serial No.			
Class	Måleudstyr		
Name	Dorn_Special		
Type	Glat Go/NoGo		
Characteristic	12H7		
Manufacturer	Mauser		
Modell			
Ext.Reg.No			
Supplier			
Standard			
Reg. Date	Wed, 12 Jan 2000	by/Owner	DEMO
Last edit date	Thu, 22 Nov 2018	By	DATATRANS
Purch. Date	Wed, 12 Jan 2000	Initial Price	
AccountNo	xx		

Use and Calibration info

State of Calibration	Y		
Check out	N	Checked out days since calibr.	0
Calibration Date	Mon, 27 Apr 2009	Colour Label	43
Calibr. Interv.	18 M	Calibration procedure	
Due Date	Wed, 27 Oct 2010	Returned for calibration	N
Instruction No	5rev.1	Version	
Calibration Location	Målerum	I/E	I
Use Status	None		
Gauge User	None		
Employee No.			
Use Location	None		
Cost location	Produktion		
Home Base			

Comment notes

Measurement Equipment Calibration System
CalibWeb

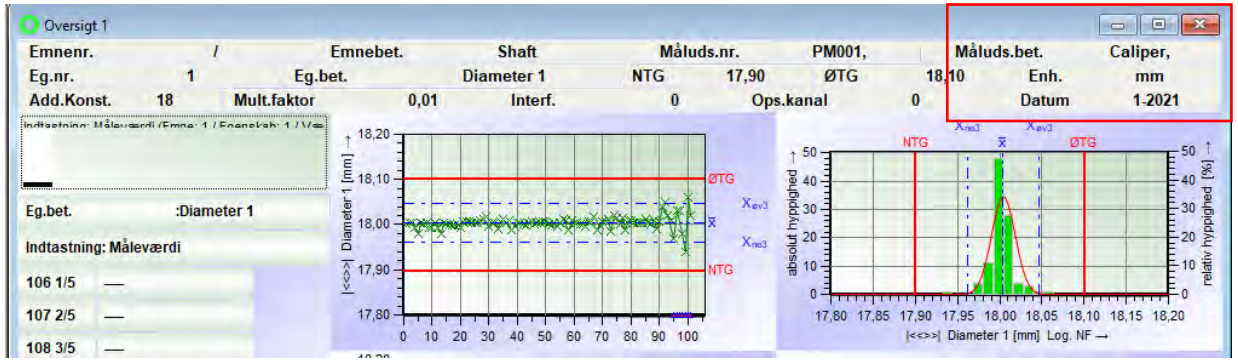
Calib is a calibration management program with additional Web viewer solution.

Feautures:

- Ready for tablet or smartphone
- Send list for next calibration by mail
- Monitor the use, calibration and repair of your equipment
- Report your calibration results and document traceability
- **Data exchange to Q-DAS software**
- Use barcode reader for quick search of the equipment status

Data exchange Q-DAS products and Calibration management

- Use the instrument information from Calib during data collection.
- Save MSA information in the calibration program.
- Document the due date during the data collection.



Validation of software

Validation

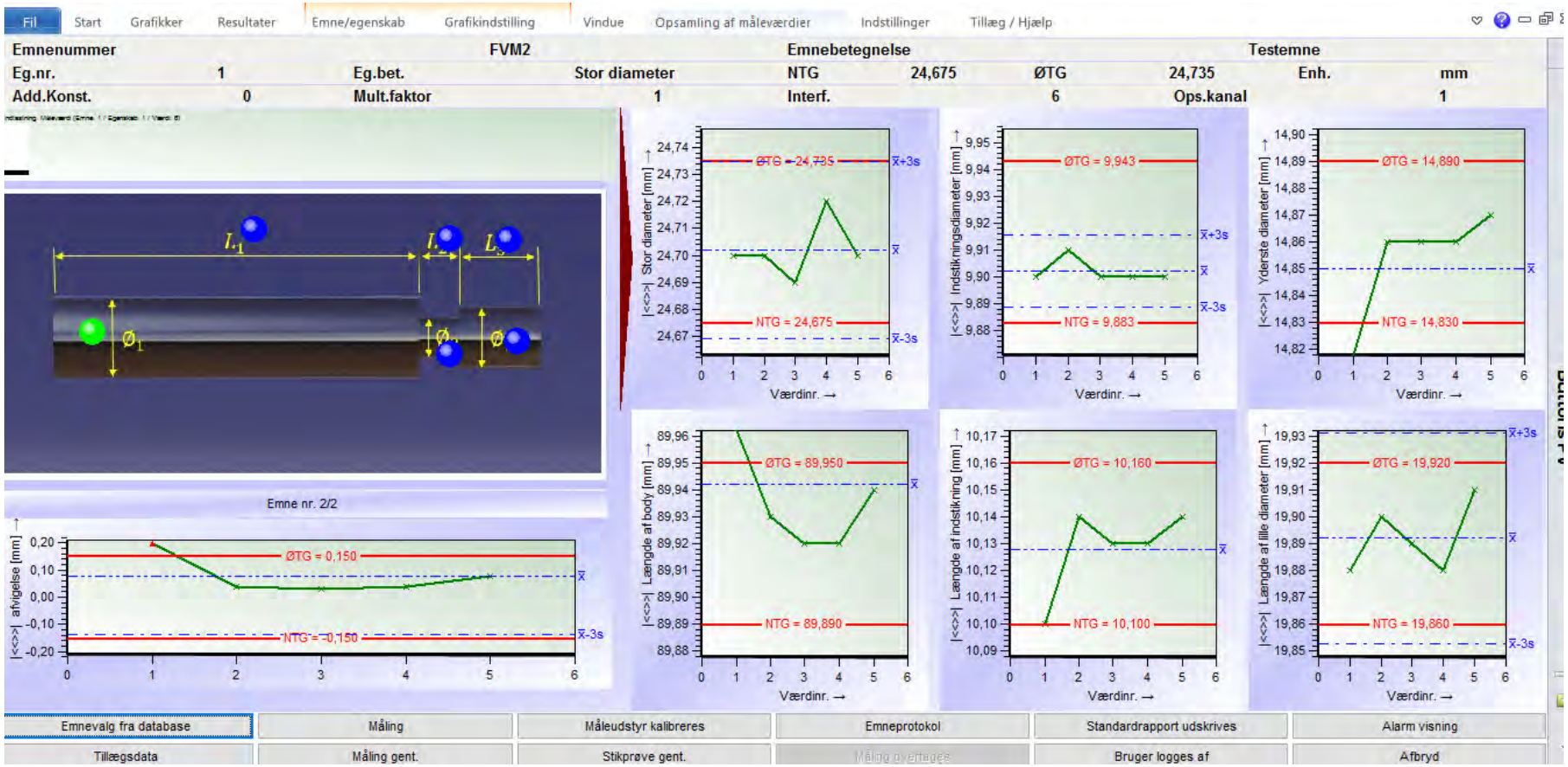
- ISO 11462-3 Guidelines for implementation of statistical process control (SPC) –
- Part 3: Reference data sets for SPC software validation
- Standard released

- ISO11462-4 Part 4: Reference data sets for measurement process analysis software validation
- Still under development
- Will be released next year

Data collecting
Procella

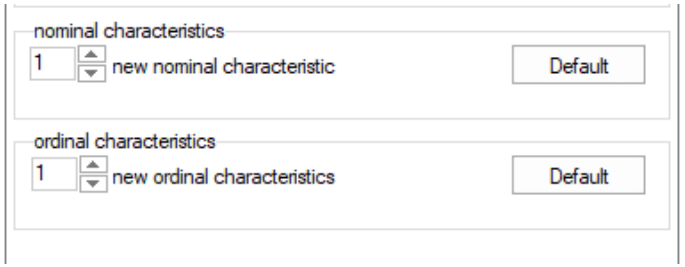
Data collecting with Procella

- Still all the different layout can be used



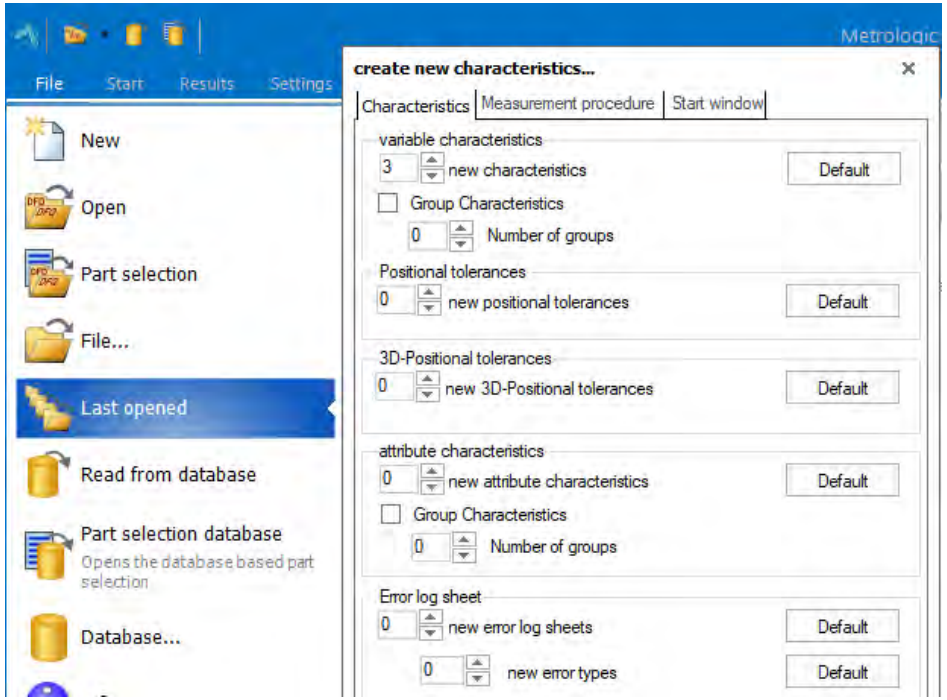
Creation of testplans

When to use nominal and ordinal Characteristics?



When you want to define the different results

Before using this characteristics you may define the possible results in the Ordinal catalog.
This catalog is valid for both types.



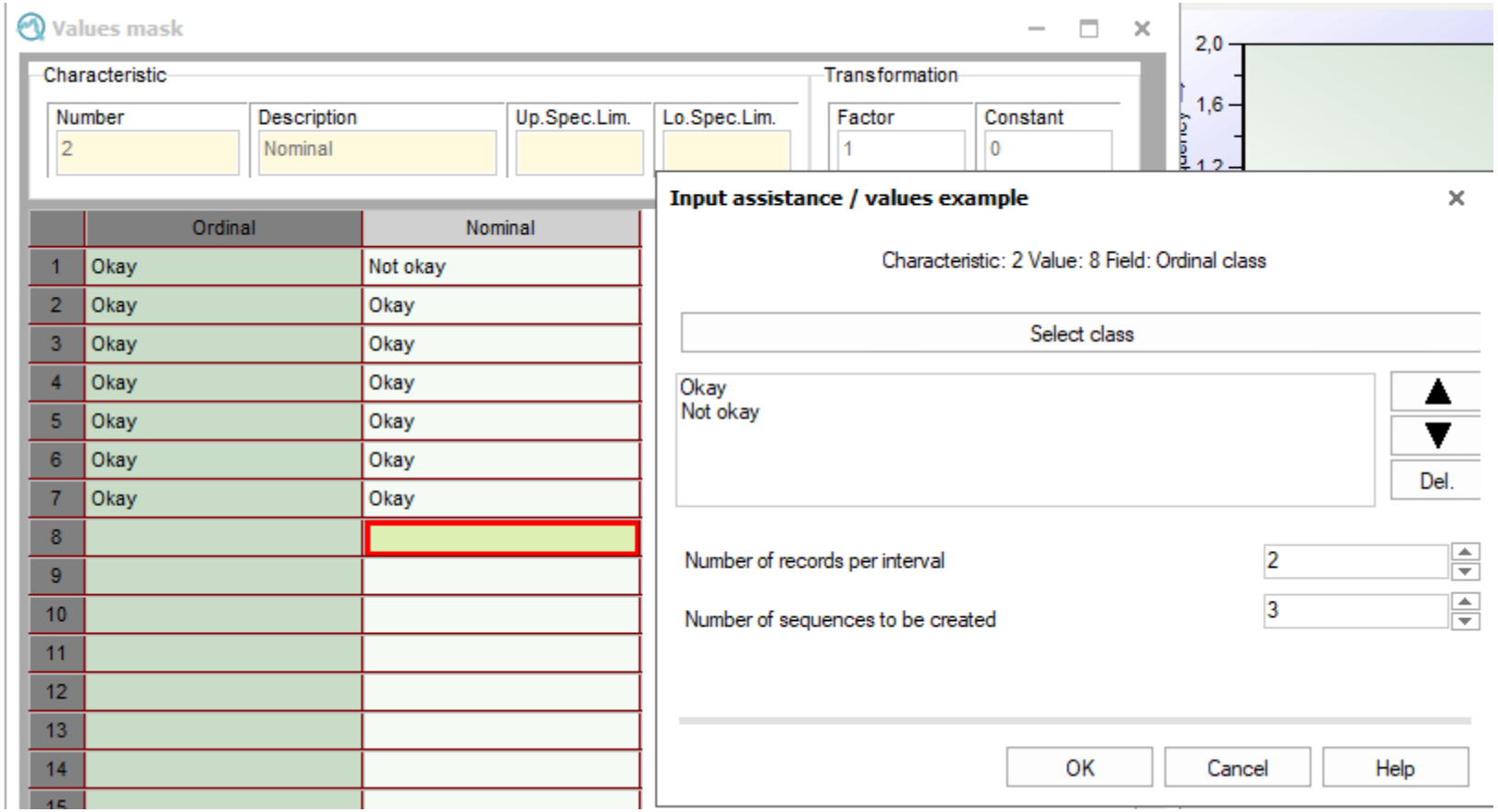
Catalogue

Ordinal Classes Catalogue

cons. no.	Number	Description	Evaluation	Rank	O.K./n.O.K.
1	1	Okay		0	O.K.
2	2	Not okay		1	n.O.K.
3	3	Okay		0	O.K.
4	4	Rework		1	n.O.K.
5	5	Not okay		2	n.O.K.
6	6	Very good		0	O.K.
7	7	Good		1	O.K.

Input Nominal/Ordinal characteristics in value mask

- Value mask.
- Input assistance gives you the possibility to fill in results.
- You can define the different possibilities from the catalog,
- You can define the number of results to be filled in.

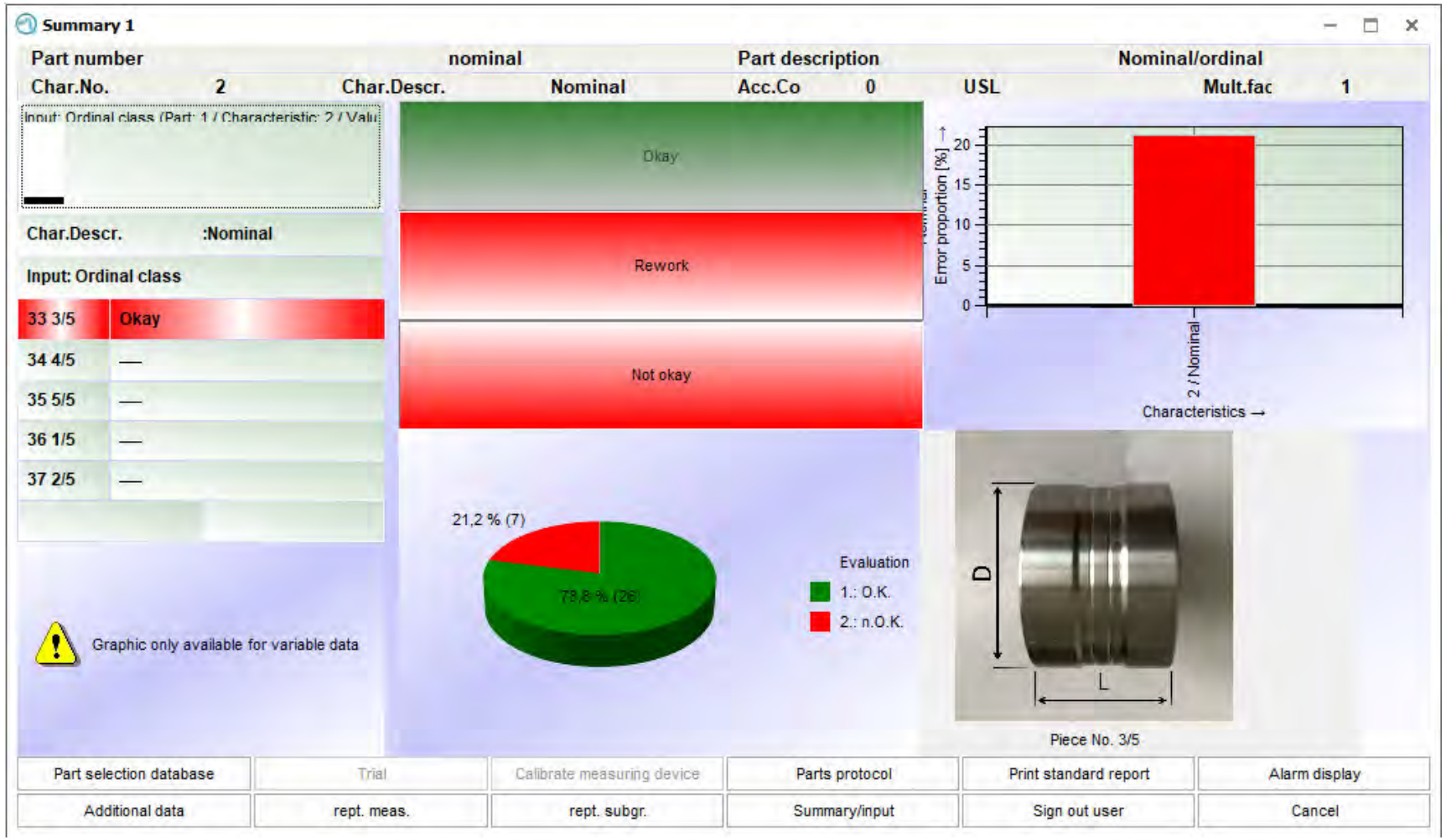


Input Nominal/Ordinal characteristics in measurement value logging

- Use classified input (F7810)
- Use a subcatalog
- Use Pie (F3760)

- Nominal = ex. true/false

- OrdinaL = Ordinal data is quantitative data which have naturally occurring orders. It can be named, grouped and also ranked.
- Ex. Critical, Significant, Important, not important-

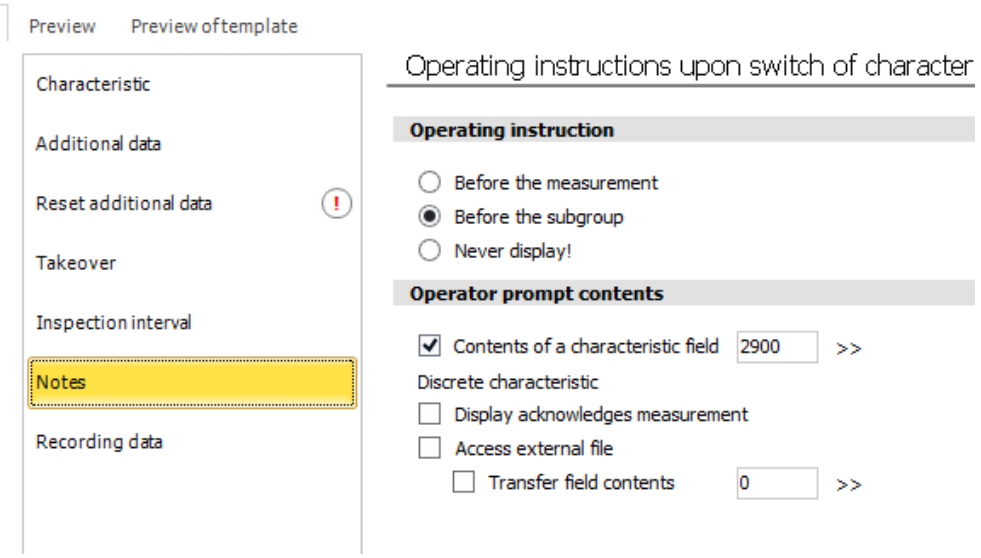


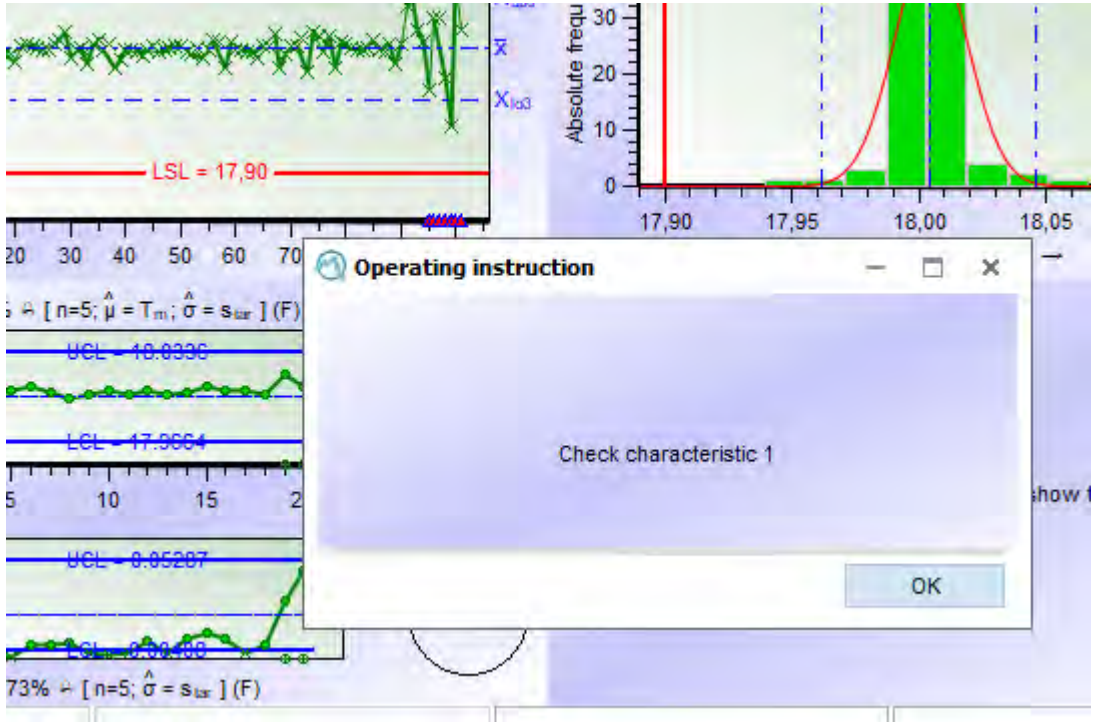
Operating instruction

Pop up info before the measurement logging

- You can inform the operator about the measurement procedure before the data collection.

- Configuration: Define the field in the characteristic mask to store the info.

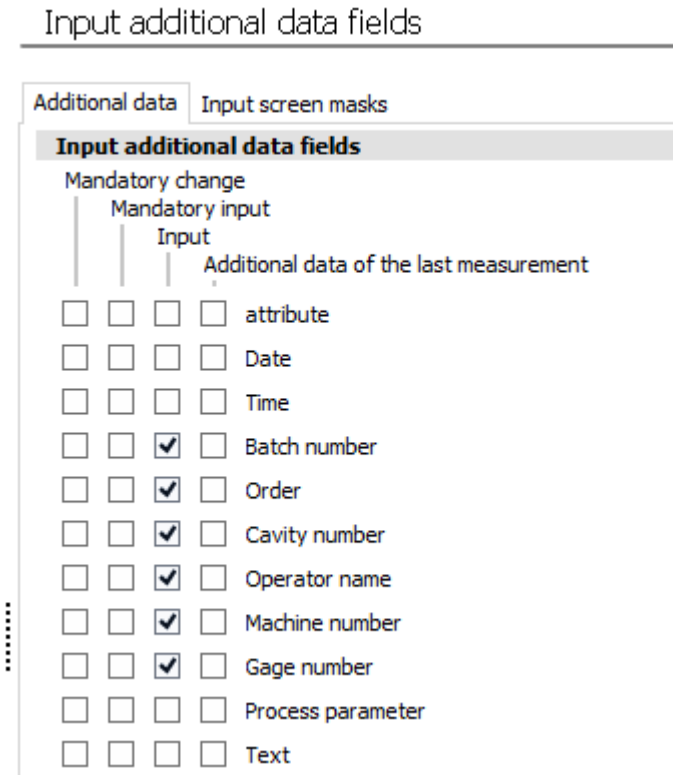




Additional data

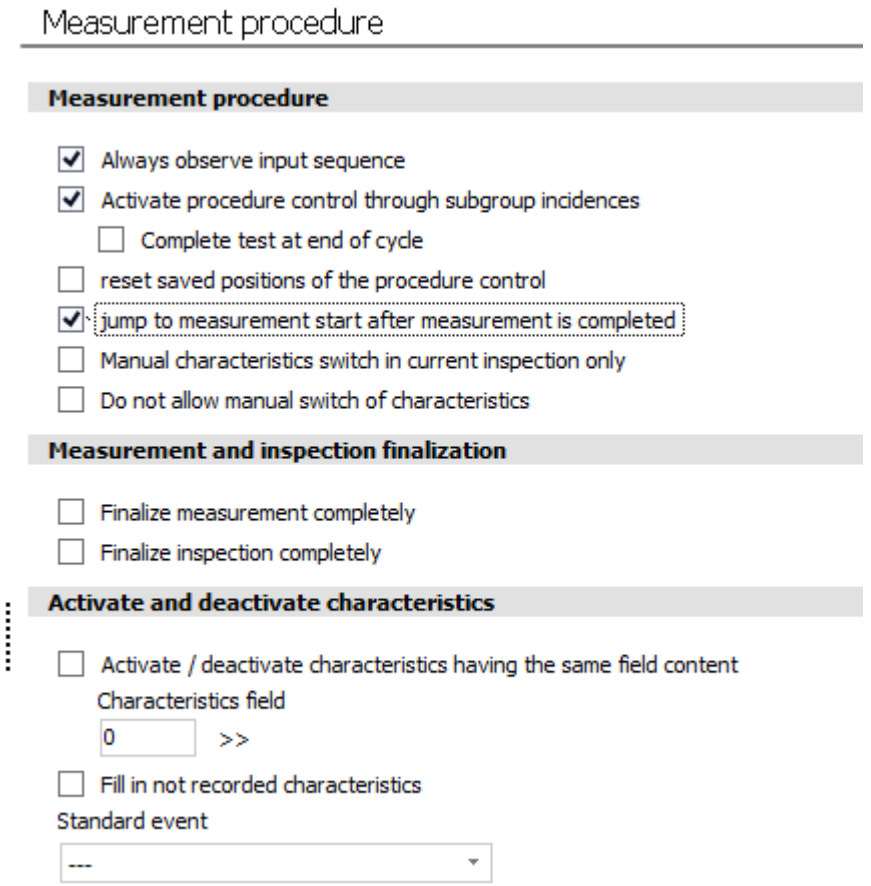
- Additional data are information linked to the measurement values.
- There are severel ways to inpot additional data.

1. In ”part selection database” menu
2. In a pop up field before the measurement logging (Measurement Value logging window)
3. In a pop up field in the measurement logging window
4. In the Value Mask window
5. In the Value Chart graphics (after the measurement logging)



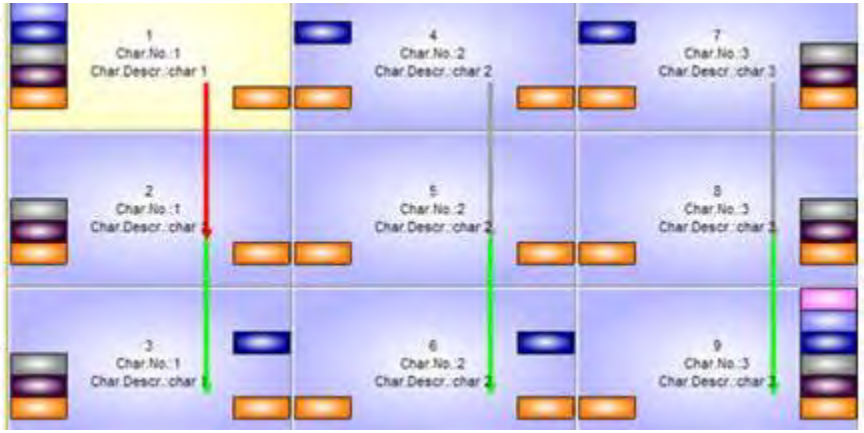
Measurement procedure

- The “Measurement procedure“ settings are only available in O-QIS in the procella module. You may adjust settings for the recording of measured values. The adjusted settings refer to the data set specific settings for an automated switch of characteristic.
- If you switch characteristics manually, please do not activate any option except for *jump to measurement start after measurement is completed and/or Always observe input sequence*
- Check this box to keep the input position even if you switch characteristics manually.



Test plan

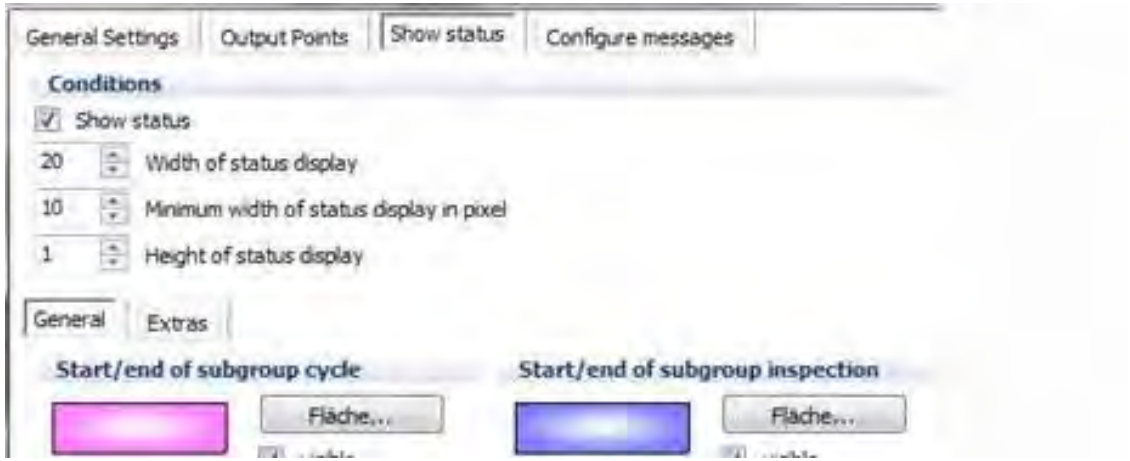
- It is easier for users to see what the current input position is if the “Test plan“ graphic is included in the respective “Summary / input” window.
- When using the “manual” input sequence please note that the forced input sequence is deactivated. Otherwise you would not be able to switch to any further characteristic.



- The respective start and the end are highlighted with a bar in the same colour. You may change the colour and the content of each bar, the width and the height individually.
- *Activate procedure control through subgroup incidences*
- If you check this box, the *Always observe input sequence* option is also activated.

Test plan

- You can change colours and deactivate some of the boxes in this menu



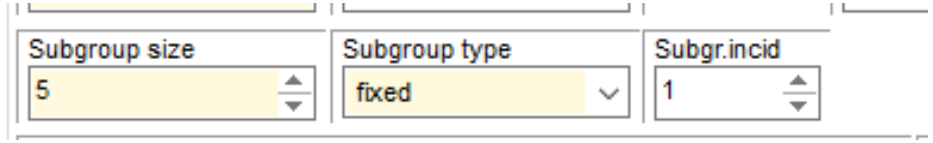
- In order to gain even more information from the test plan, you may display different icons for various tasks in the test plan, e.g. when to store data, enter additional data or display alarms.

Testplan

- Additional boxes can be defined

Always observe input sequence option

- By checking this box the program always considers the subgroup incidences specified in the characteristics mask in this measurement run. Characteristics are only measured in every n-th measurement run now.



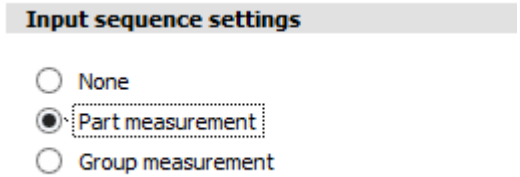
- If the subgroup incidence is set to “0“ or “1“, the respective characteristics are measured in each measurement run.

<u>Special case: subgroup incidence of ”-1“</u>

- Select a subgroup incidence of ”-1“ in order never to record this characteristic in a normal measurement run. Use this setting for special characteristics that shall be recorded in special measurements (Setting|Special measurement) e.g. after the end of a shift.

Part measurement

- This option combines all characteristics of the part into a single measurement.



- Group measurement
- This option combines all characteristics of the group into a single measurement
- Use group measurement also if you have e.g. two different fixtures.

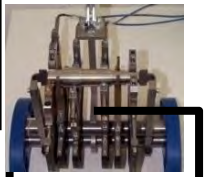
<u>Note about group measurements:</u> In case you activated the *Group measurement* option but there are not any logical groups in the data set, each characteristic is considered to be a group.

Concept datacollection and SPC

Process optimization DOE

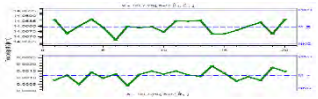
Process control

Accurate measurements



Accurate manufacture $Y=f(x_1, x_2 \ldots x_n)$

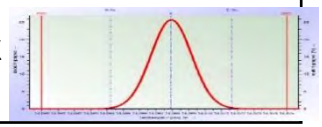
Comparison between control limits and results with SPC



Measure-ment data

Industri 4.0

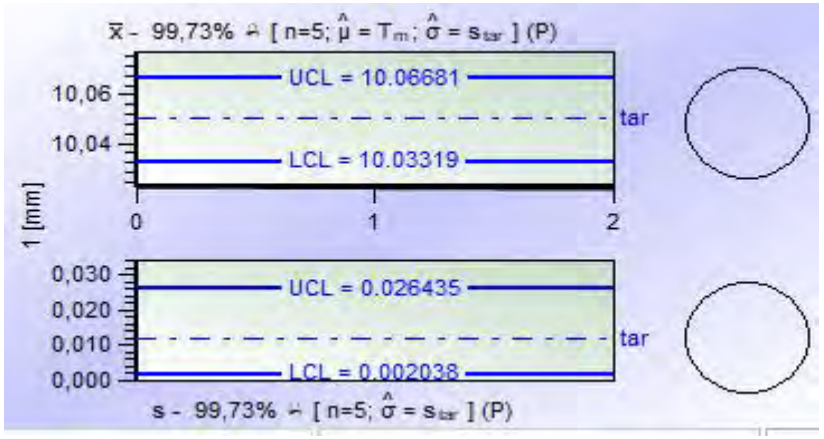
Process capability analysis - indicies Cp and Cpk

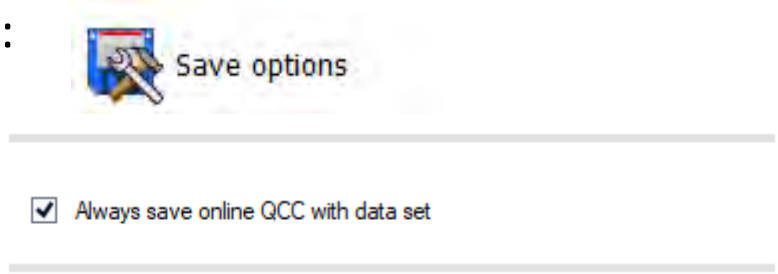


How to use SPC chart in Procella

- Two different situations:

1. No Control Chart is present in the file/record set.
   a) Procella can calculate a control chart based on the tolerance and the capability requirement.
   b) Procella do not save the chart if you do not mark this setting:

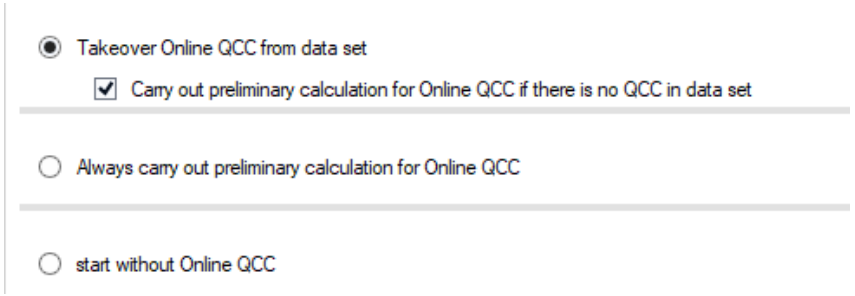




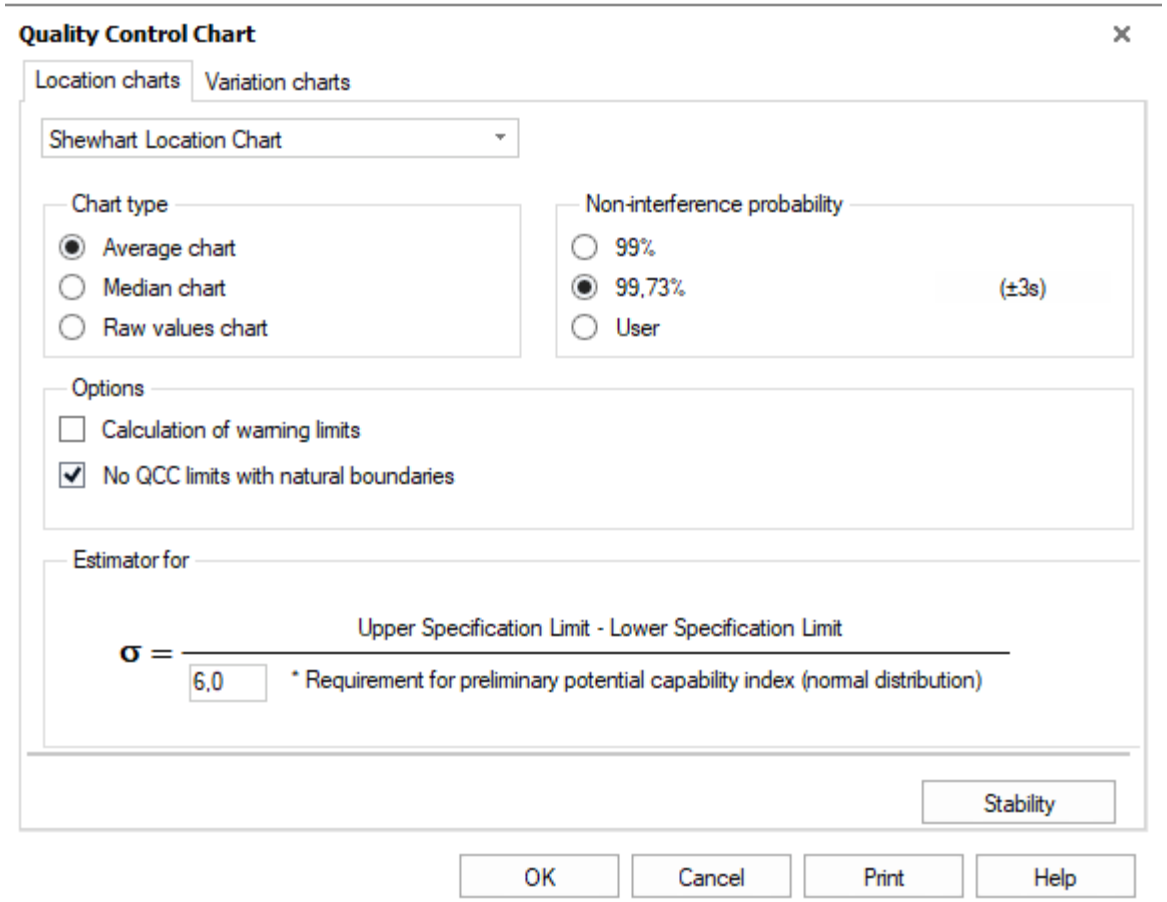
2. Control Chart is present in the record set.
   a) The control chart is stored in the dataset from qs-STAT

Predefined SPC chart in Procella

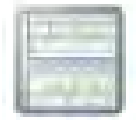
- The SPC chart can be calculated without existing data if it is defined in the evaluation strategy.



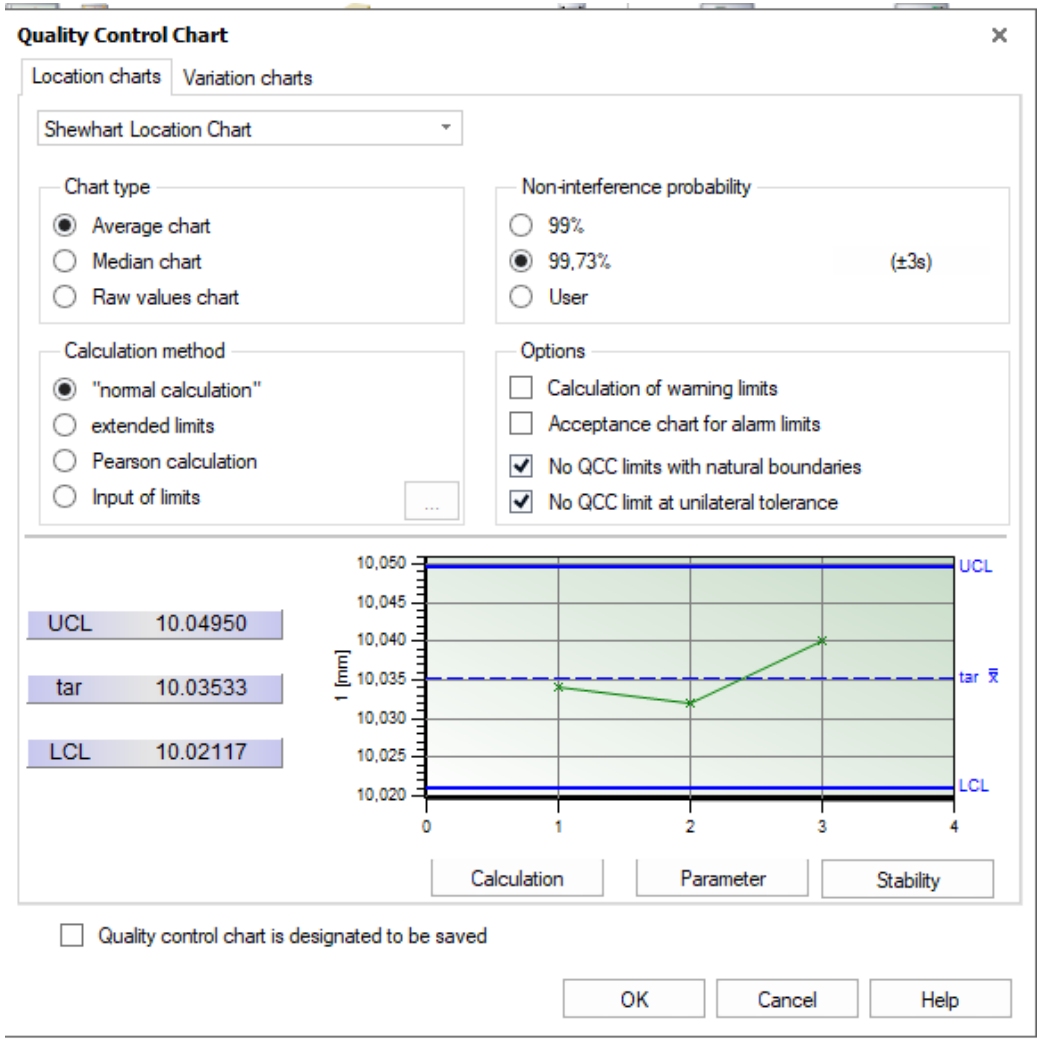
- You can save the SPC.chart in Procella
- But be carefull what you save.



Definition of the SPC-chart in qs-STAT process analysis

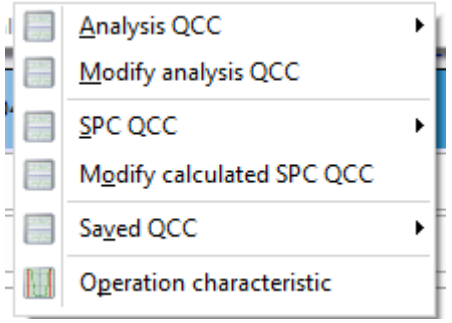


- Design or modify the SPC chart in Graphics/SPC QCC.
- Define the location and variation chart.
- Choose between these charts
  - Shewhart
  - (modified Shewhart)
  - Acceptance
  - EWMA
- You should use the defined SPC-chart in your datacollection



Different types of quality control charts in Q-DAS

- There are different types of quality control charts available for various applications. There are analysis QCCs, SPC QCCs, saved QCCs and online QCCs but you may also select and use the operation characteristic.
- There are different designs for each type of chart (e.g. Analysis QCC|Design 1 to Design 6). As the description indicates the only difference is in the design, but the calculation remains the same.

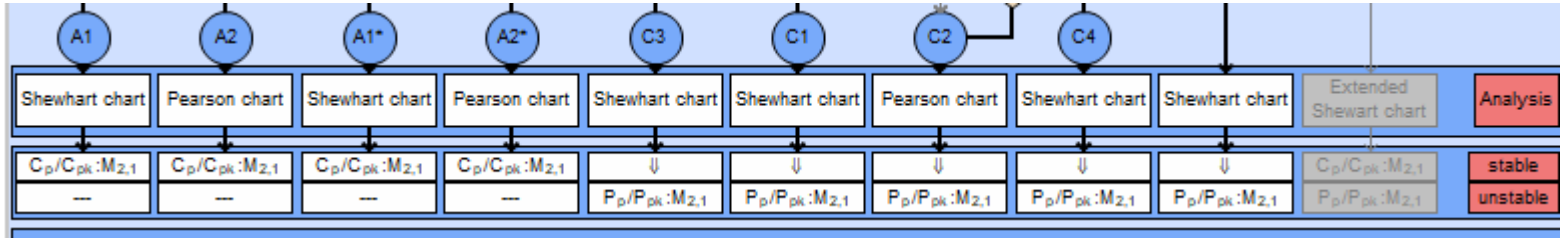


- In the data collection with Procella you will always use the Online QCC.

When you define the QCC in qs-STAT then the SPC QCC will be transferred into an Online SPC QCC.

Analysis SPC chart

The analysis QCC is used to determine the stability of the data set and defines whether to use the nominal value of the *QCC stable* or *QCC unstable* tab in the evaluation strategy requirements.
In case of instabilities, the characteristic is considered to be not capable. If a process characteristic is assessed to be stable, there are not any or only an insignificant number of control limit and specification limit violations.
Not capable processes wil be evaluated using Pp/Ppk.



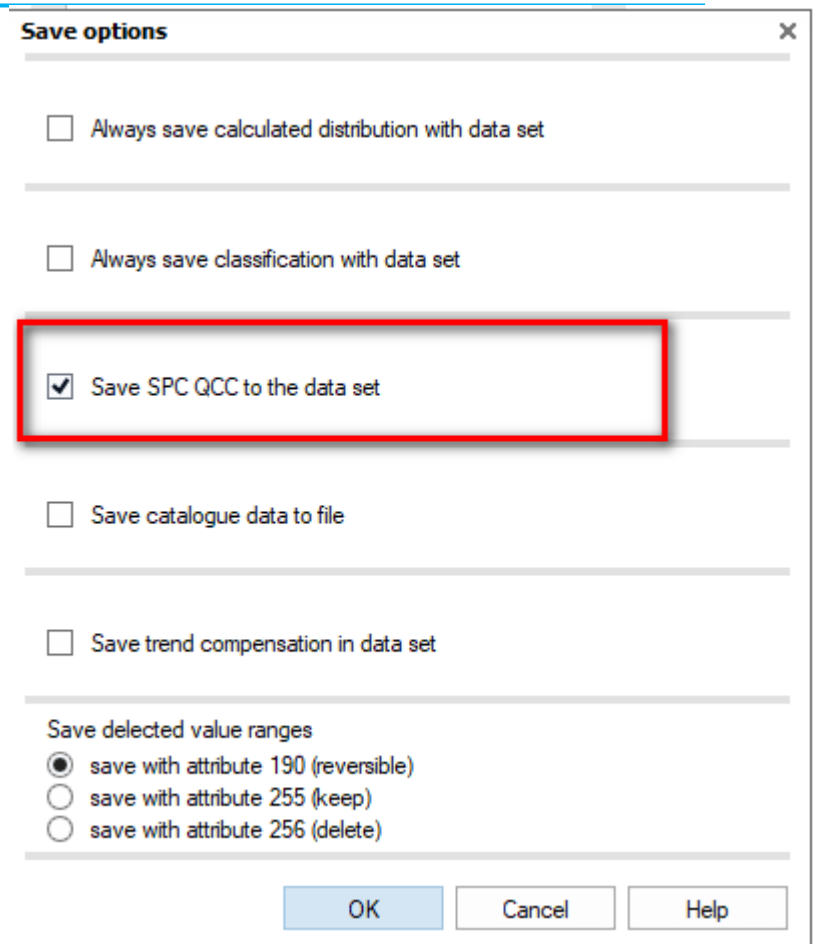
After opening a data set or after selecting the *Execute evaluation* option the analysis QCC is always recalculated according to the respective evaluation strategy.
This QCC will not be stored.

SPC QCC

The SPC QCC serves as a template storing the quality control chart for data recording (O-QIS / procella). It is automatic calculated by evaluation in qs-STAT. You may modify it and save it in qs-STAT.
Be aware of that every time you save the data set or save it for specific characteristics only the actuel Online Chart in Procella will be changed (depending of the settings).

The calculation of the SPC Chart is defined in the evaluation strategy.

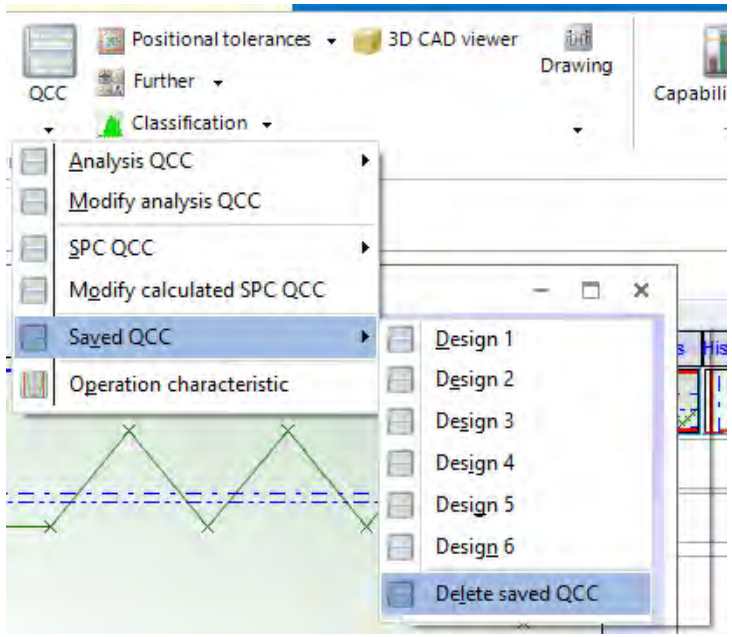
After opening a data set or after selecting the *Execute evaluation* option the program always calculates the analysis QCC according to the respective evaluation strategy.

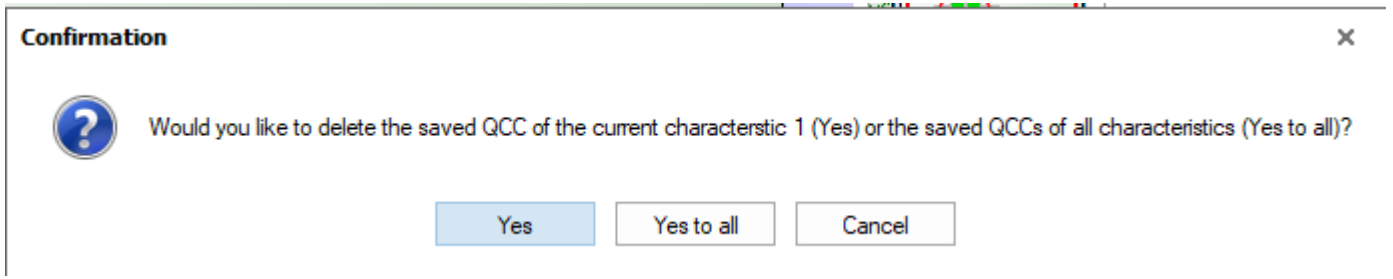


Saved QCC

- Use the saved QCC to observe the limits saved at last of the last saved QCC.

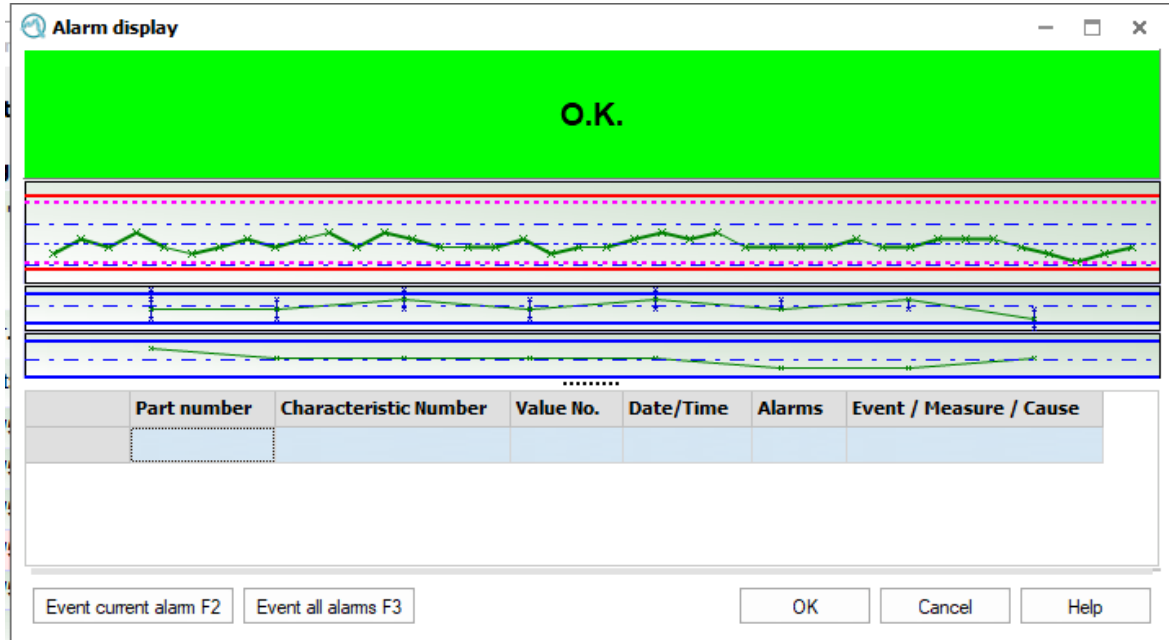
- In case you want to delete a saved QCC, you apply the “Delete saved QCC” function under Graphics|Individual characteristic graphics|QCC|saved QCC. You have got the option to delete the saved QCC of the current characteristic or the saved control charts of all characteristics.

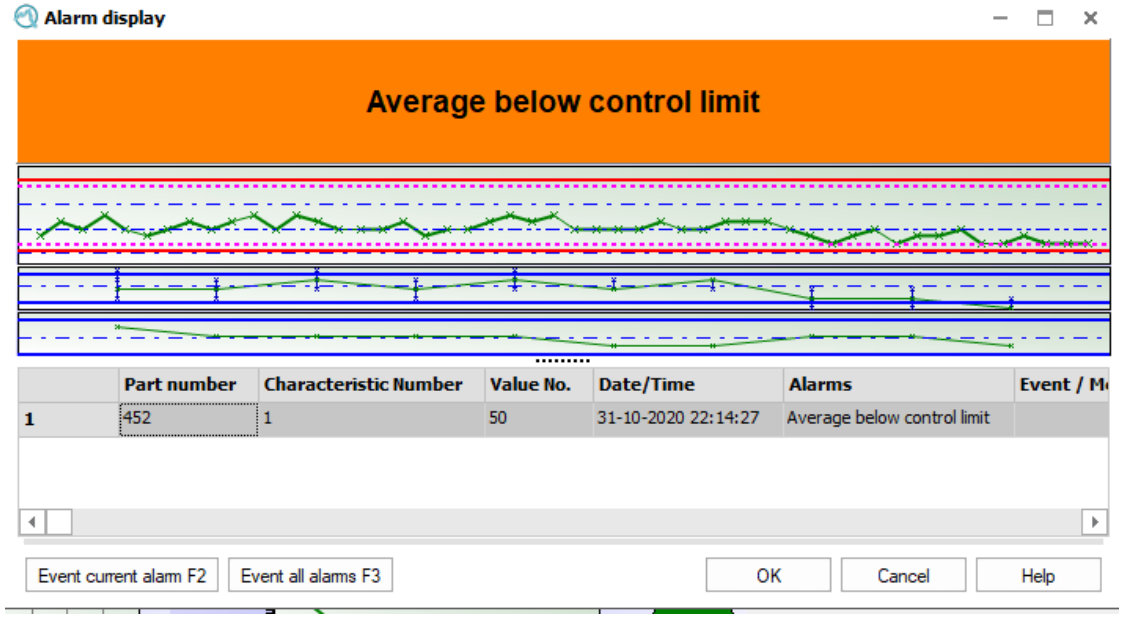




Online QCC

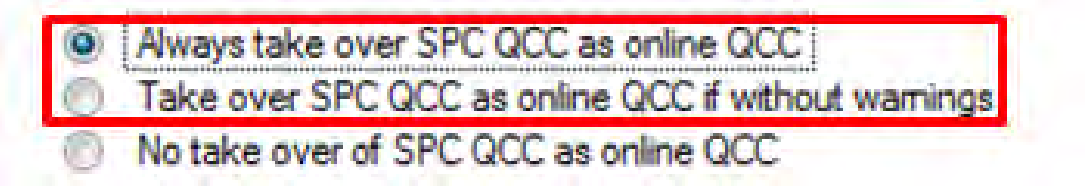
- You apply the online QCC in order to detect alarms during the recording of data in O-QIS / procella. Depending on the settings adjusted in the evaluation strategy, an online QCC may be the last saved SPC QCC or a preliminary QCC. In case you do not use any QCC at all, the program does not record any alarms.





Save options

- You options for saving control charts are restricted in O-QIS / procella. The save options in procella store the online QCC to the data set . You may change the respective online QCC by using the Modify online QCC or Input online QCC option under Graphics|QCC|Online QCC.
- You may also take over the SPC control charts after its calculation as an online QCC in O-QIS; however, you have to activate one of the following two radio buttons in the evaluation strategy .

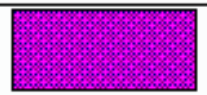


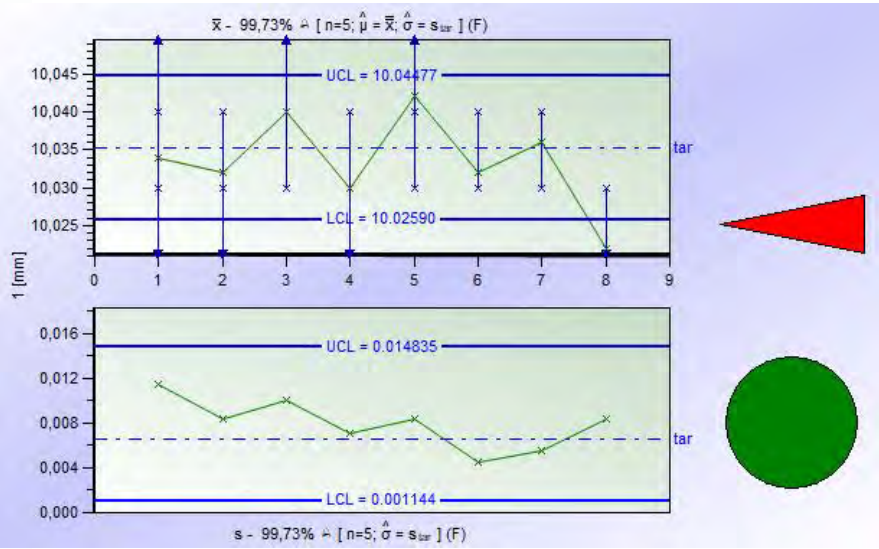
- The control charts are only saved in case the Always save online QCC with data set save option is activated. The storage always applies to all characteristics. You cannot modify the QCC for a single characteristic in procella.

Show control limits and individuals

Use this icon to show an additional process evaluation by means of symbols.

The following table explains the meaning of the single symbols.

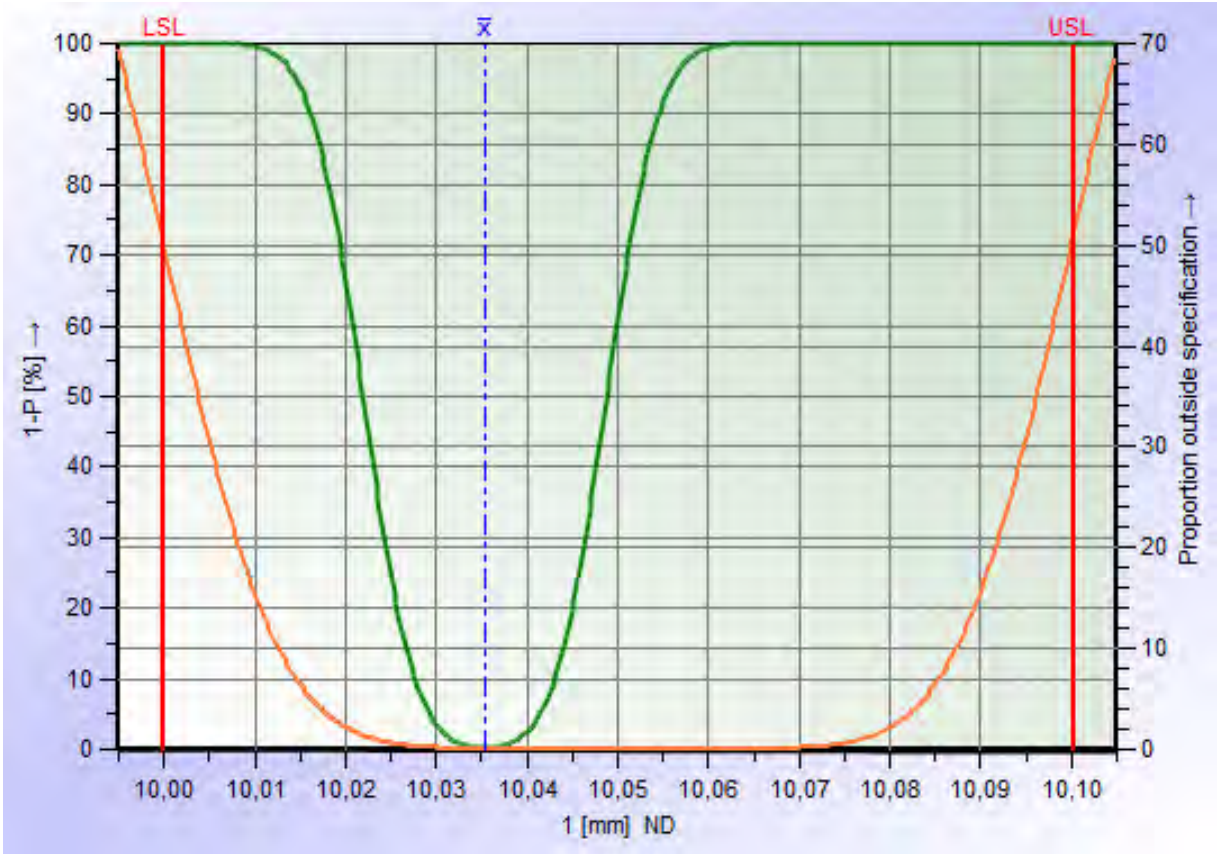
	Process location/variation n.o.k. (red) or o.k. (green)
	Control limit violation caused by last subgroup
	Violation of specification limits caused by the values of the last subgroup
	Run above / below the centre line
	Downward trend
	Upward trend
	Middle third, less than 40% within the middle third
	Middle third, more than 90% within the middle third



Operation characteristic

- You open the “Operation characteristic“ graphic by selecting Graphics|Quality control chart|QCC or by selecting Graphics|Individual characteristic graphic|QCC. The operation characteristic helps to evaluate the sensitivity of a quality control chart.

- The x-axis serves as the values axis and, depending on the settings, the control probability 1-P [%], the non-interference probability P [%] or the average running length is plotted on the y-axis.



Average run length

Shewhart Location

Non-interference probability

- [ ] 99%
- [x] 99,73%
- [ ] User 99,90000 %

Display type

- ( ) Interference probability
- ( ) Non-interference probability
- (•) Average running length (ARL)

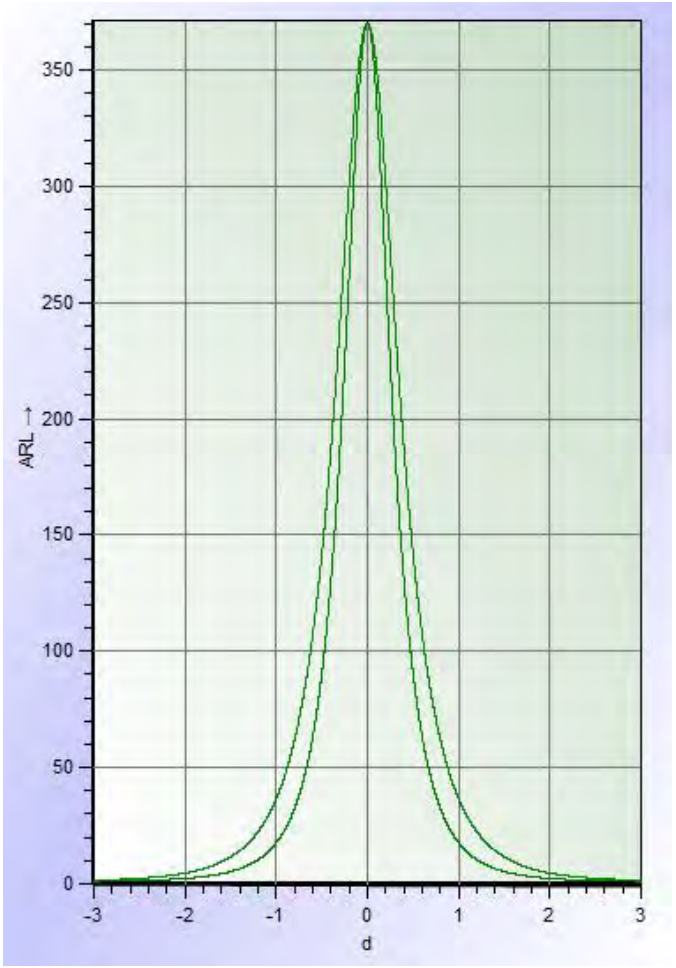
Sample size: 2

initial scale value: -3

final scale value: 3

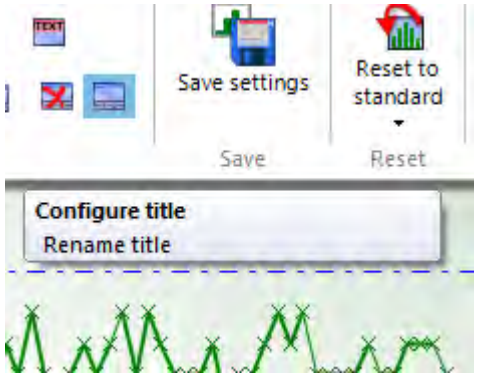
Location legend

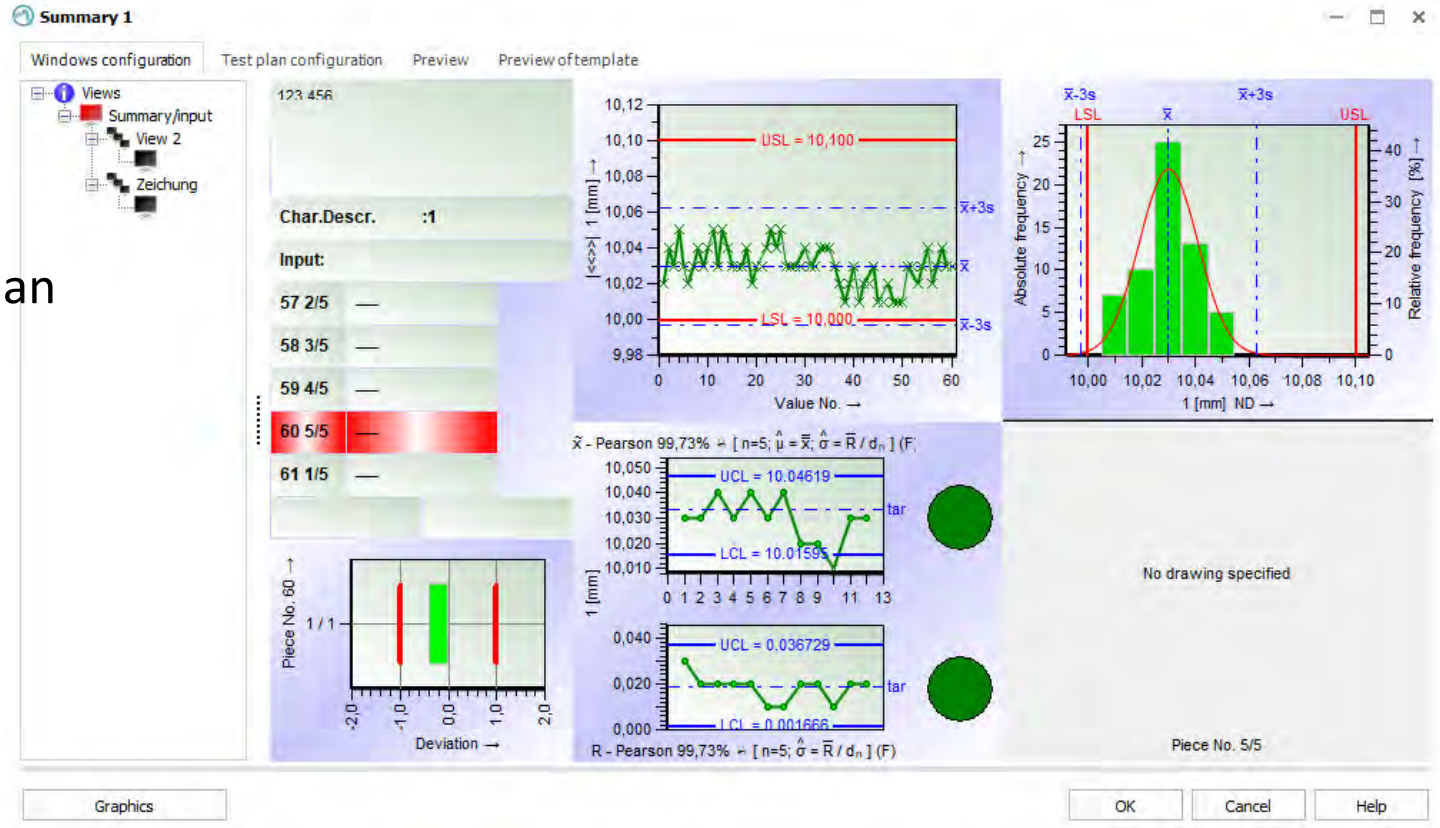
- ( ) upper left
- ( ) upper right
- ( ) lower left
- ( ) lower right



Configuration of the measurement value logging

- Right click on the mouse or use ”Setting/Configuration
- You may also configure the testplan settings in the menu
- Change of the name

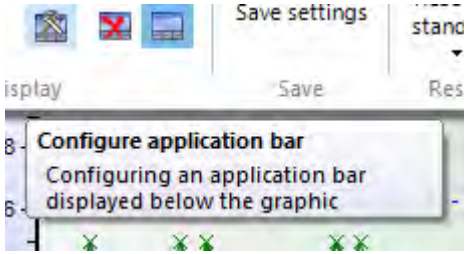


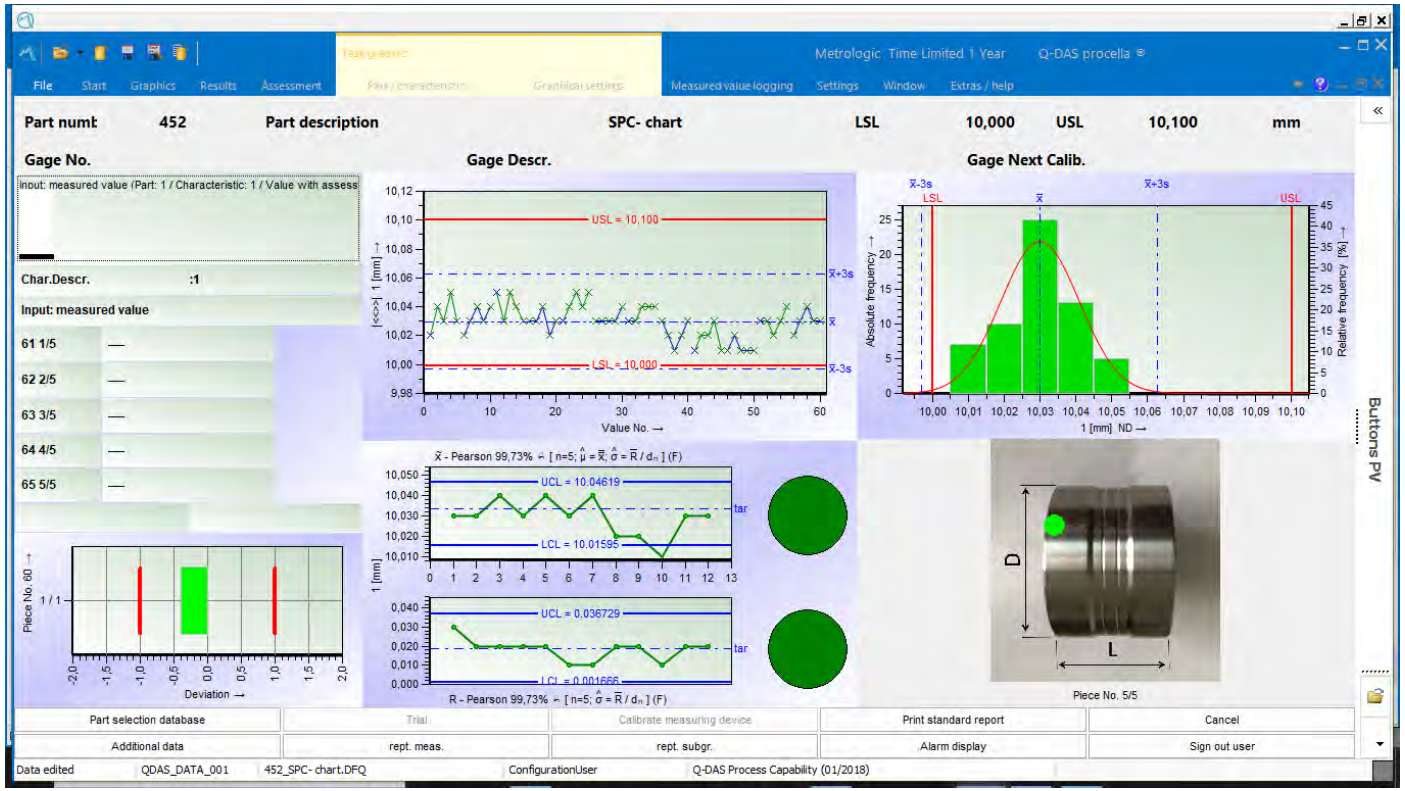


Configuration of the logging sheet

Configuration of the measurement value logging

- Configuration of the application bar
- You can define the content of bottons also with a graphic





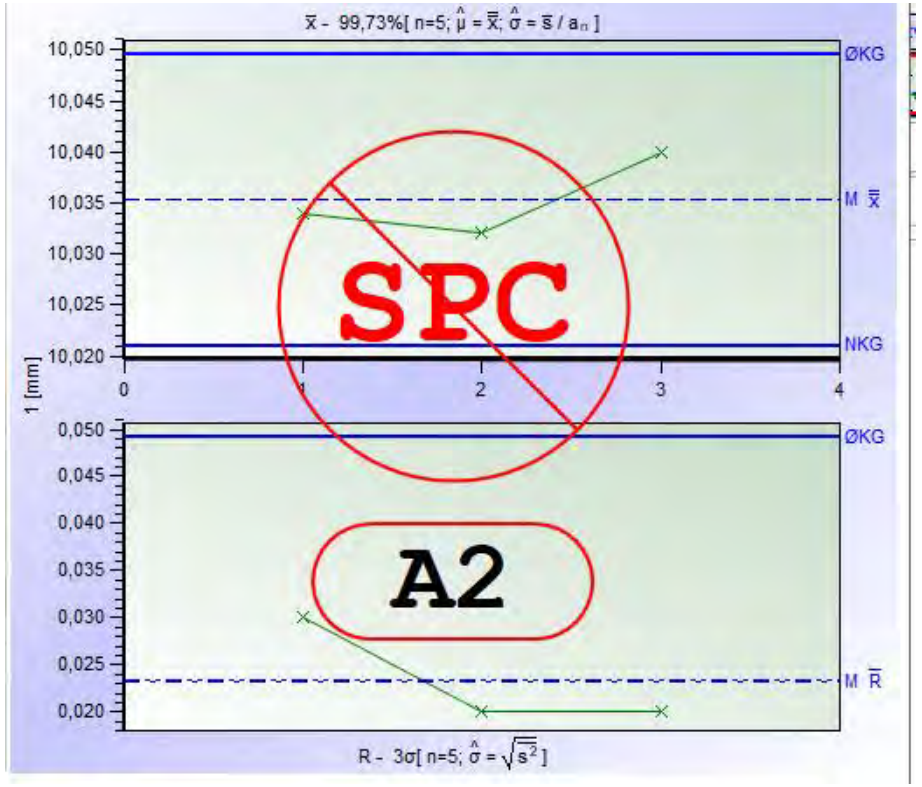
Define the window to the actual use
Save the window in the datafile/database

Check of the SPC-chart

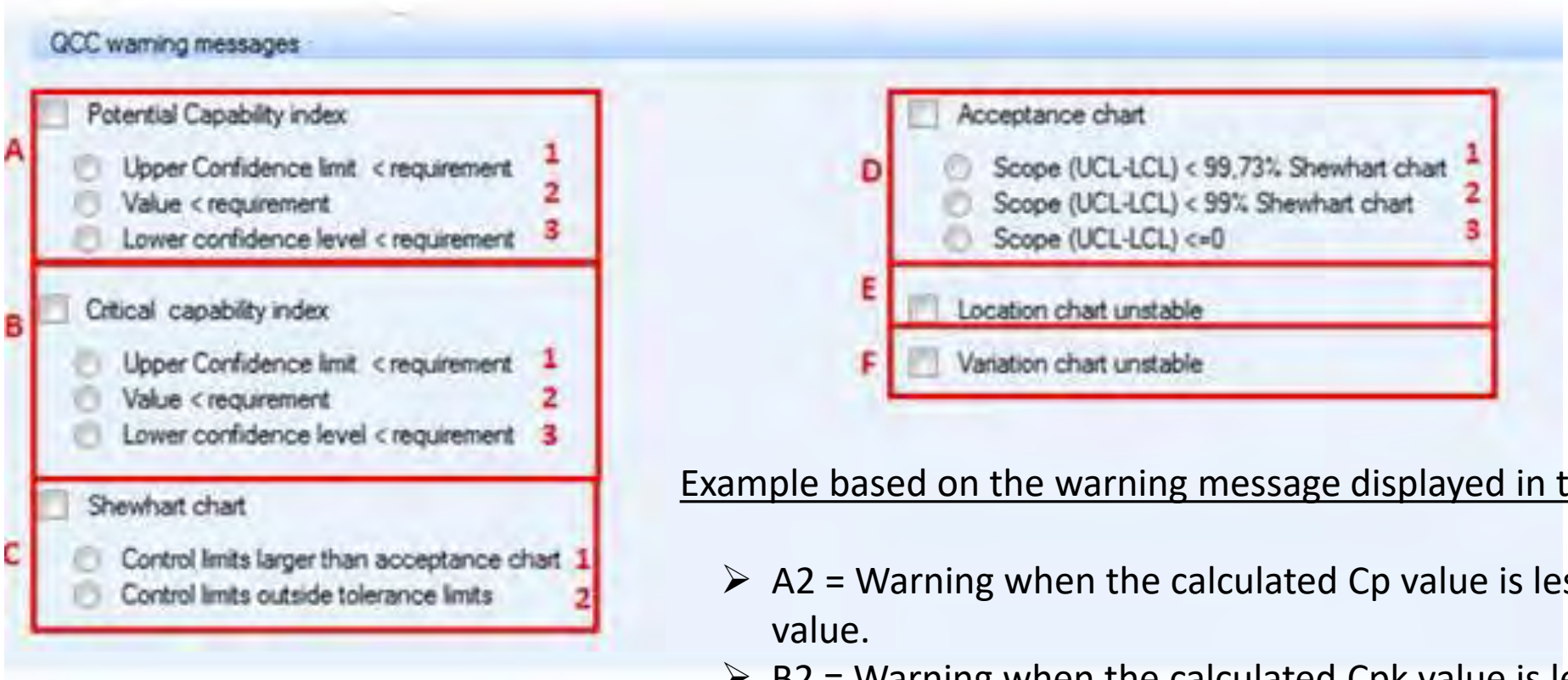
- You can check if the SPC-chart guarantee the requirements to the process (Cp).

QCC warning messages

- [x] Potential Capability index
  - ( ) Upper Confidence limit < requirement
  - (•) Value < requirement
  - ( ) Lower confidence level < requirement
- [ ] Critical capability index
  - ( ) Upper Confidence limit < requirement
  - (•) Value < requirement
  - ( ) Lower confidence level < requirement
- [x] Shewhart chart
  - (•) Control limits larger than acceptance chart
  - ( ) Control limits outside tolerance limits
- [x] Acceptance chart
  - ( ) Scope (UCL-LCL) < 99,73% Shewhart chart
  - ( ) Scope (UCL-LCL) < 99% Shewhart chart
  - (•) Scope (UCL-LCL) <=0
- [ ] Location chart unstable
- [ ] Variation chart unstable

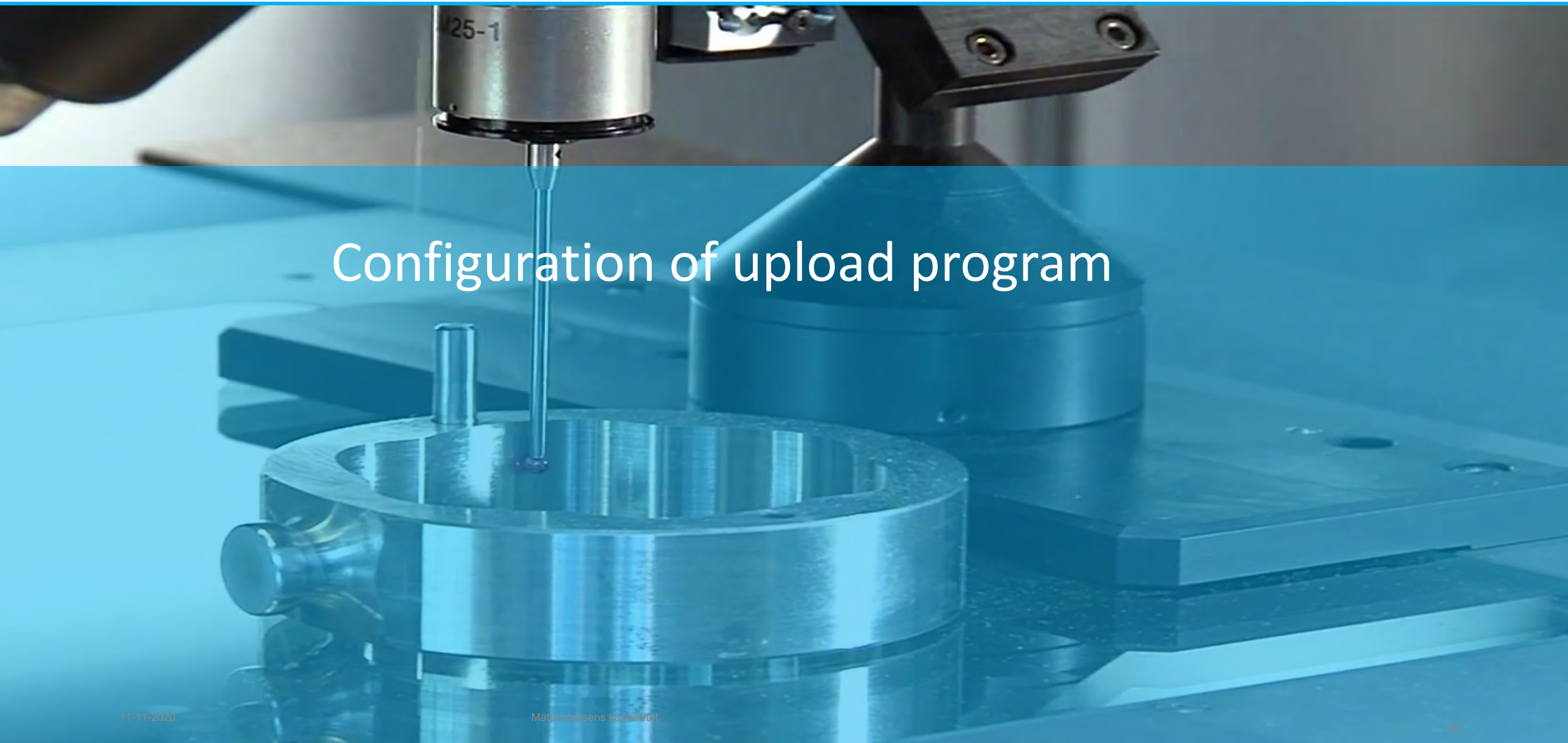


Definition of the abbreviations



Example based on the warning message displayed in the graphic above:

- A2 = Warning when the calculated Cp value is less than the required Cp value.
- B2 = Warning when the calculated Cpk value is less than the required Cpk value.
- D3 = The scope between UCL and LCL is equal or less than 0.
- E = Location chart is not stable.



Configuration of upload program

Next meeting

February