Yield Statistics (YST) **AN 48**

Application Note to the *KLIPPEL QC* SYSTEM v5.0

The yield is the overall criteria of the production process. Using Klippel QC the quality of DUTs can be ensured, however, the QC-System is focused on the running process. Keeping track of the production yield can be difficult, especially when multiple testing lines are used simultaneously or when the overall yield of a factory is to be analyzed.

An overview of the yield is calculated by the *YieldStatistics* module based on log files that were generated by the *KLIPPEL QC* System. Log files of multiple production lines or tests can be parsed and a quick overview is presented.

The output can be tailored to a specific period of time, to operators or tests.

For further analysis in 3rd party statistics software, a merged CSV file of all log files filtered with the specified criteria (date/time range, operator, serial number, ...) can be produced easily.

This application note shows several application examples in a tutorial.

Verdict statistics

	Overall	Resp	Level	Pol
Yield (%)	64.88	97.01	78.72	97.03
Valid	94206	94206	94206	94206
Pass	61119	91389	74156	91409
Warning	0	0	0	0
Fail	33087	2817	20050	2797
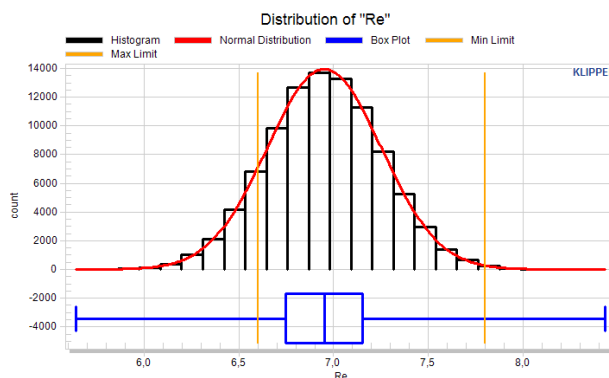
Distribution of "Re"

CONTENTS:

Requirements

Log files	The *KLIPPEL QC* System must be configured to write log files that can be analyzed by the *Yield Statistics* module. This is enabled by default. The summary log files are small in size and do not affect the test performance. The control task setup defines the logging:	

The *Yield Statistics* module searches log files recursively in one folder - sub folders can help to organize multiple production lines.

Please note that log files are only written by *KLIPPEL QC* system if limits are present.
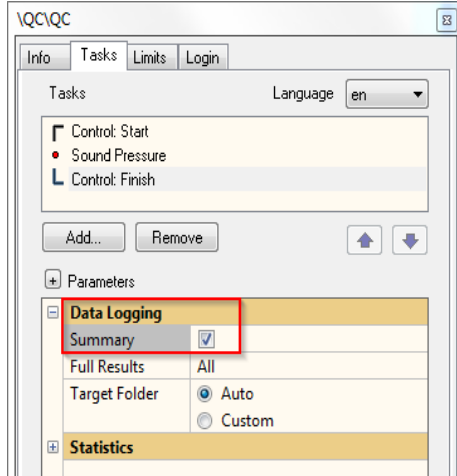
Software

The software (including all scripts and helper programs) is part of the *Klippel QC* system. The described features may require QC5. For earlier releases the statistics script is available, but features may not be available.

On non-measurement PCs (without hardware connected), the Remote Configuration setup should be installed.

No Production Analyzer hardware or dongle is required.

License

There is no license required to run the yield statistics. This function is free of charge.
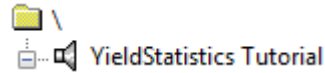
Tutorial: Setup

(Example data is delivered along with this document.)

Create a simple statistics from scratch

Note: These instructions show how to create a statistics operation from scratch. Quick access is explained below in the integration section of the tutorial.
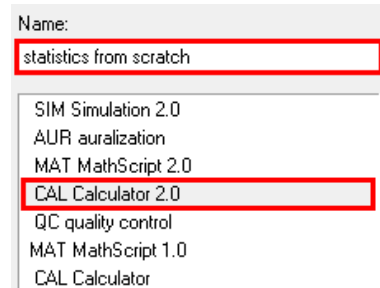
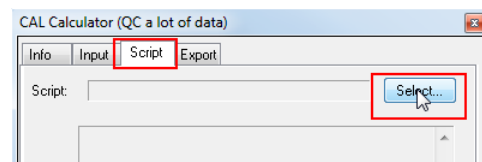Open the database *tutorial.kdbx* and create a new object parallel to the existing one.

Create a driver, give it a name, e.g. my_statistics

and a new CAL operation.

Load the *YieldStatistics* module, by selecting the script file YieldStatistics.klb, located in <AppData>\Scripts5\Klippel\QC\Tools.

The AppData path is shown in dB-Lab's help → diagnostics windows in tab "Folders".

After running the script you should see the very basic statistic providing an overview of the verdicts, single values and valid measurements.

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Date/Time End	2016-03-15 09:46:11:0
Ignored SV	NI_Runs

Statistics: "AN48_YieldStatistics"

Verdict statististics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	93.12	99.87	98.71	99.90	93.78	99.95	100.00	99.95	99.92	99.92	99.95	99.69
Valid	3865	3872	3872	3872	3872	3872	3872	3872	3871	3871	3871	3864
Pass	3599	3867	3822	3868	3631	3870	3872	3870	3868	3868	3869	3852
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	266	5	50	4	241	2	0	2	3	3	2	12
Faulty	7	0	0	0	0	0	0	0	1	1	1	8
Rate (%)	0.18	-	-	-	-	-	-	-	0.03	0.03	0.03	0.21
Noise	7	0	0	0	0	0	0	0	1	1	1	8

Single value statistics

	Re	Fs	Qts	Level
All	$\bar{x}$: 3.424 Min: 0.6148 Max: 4.023 σ: 0.1459 N: 3865	$\bar{x}$: 132.4 Min: 123.8 Max: 372.5 σ: 4.104 N: 3865	$\bar{x}$: 1.235 Min: 0.08266 Max: 1.566 σ: 0.08719 N: 3865	$\bar{x}$: 91.04 Min: 90.39 Max: 114.6 σ: 3.411 N: 3865
Passed	$\bar{x}$: 3.438 Min: 3.144 Max: 3.822 σ: 0.1261 N: 3599	$\bar{x}$: 132.3 Min: 130.4 Max: 134.1 σ: 0.4607 N: 3599	$\bar{x}$: 1.244 Min: 1.068 Max: 1.504 σ: 0.07605 N: 3599	$\bar{x}$: 90.98 Min: 90.39 Max: 114.6 σ: 3.227 N: 3599
Limits	[2.955 .. 3.612] (81) [3.132 .. 3.829] (3784)	[111 .. 150.1] (81) [112.3 .. 151.9] (3784)	[0.9283 .. 1.256] (81) [1.116 .. 1.509] (3784)	[111.6 .. 117.6] (81) [87.39 .. 93.39] (3784)

You can arrange the windows and save the window settings because now we're only interested in the window "HTML out".

☐ Status
☑ HTML out
☐ Script
☐ Log
☐ Documentation
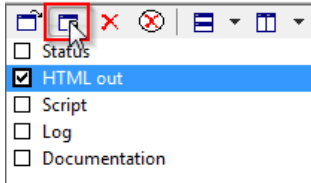
| **Change the input folder** | The previous example analyses the two example summary log files. They have different limit settings and the test settings don't really match. |

To analyze data from one line only, the folder may be specified as absolute or relative (relative to the database's location) path. If nothing is specified (as in the previous example), the current database path is used.

If you unpack the tutorial archive, two folders are parallel to the database. We can use a relative specification for using everything in folder Log_2. You could also specify it as an absolute path, e.g. 'D:\AN48\tutorial\Log_2'

General	
Location of log files	Log_2

Hit ➡ Run to calculate the statistics of the defined location.

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics\Log_2
Date/Time End	2016-03-15 09:59:50:8
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statististics

	Overall	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz	Imp	Re	Fs	Qts
Yield (%)	93.34	100.00	100.00	100.00	99.97	99.97	99.97	100.00	100.00	98.71	100.00	93.72
Valid	3784	3789	3789	3789	3788	3788	3788	3783	3789	3789	3789	3789
Pass	3532	3789	3789	3789	3787	3787	3787	3783	3789	3740	3789	3551
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	252	0	0	0	1	1	1	0	0	49	0	238
Faulty	5	0	0	0	1	1	1	6	0	0	0	0
Rate (%)	0.13	-	-	-	0.03	0.03	0.03	0.16	-	-	-	-
Noise	5	0	0	0	1	1	1	6	0	0	0	0

Single value statistics

	Level	Re	Fs	Qts
All	x̄: 90.54 Min: 90.39 Max: 90.93 σ: 0.03144 N: 3784	x̄: 3.427 Min: 3.026 Max: 4.023 σ: 0.1387 N: 3784	x̄: 132.3 Min: 123.8 Max: 134.1 σ: 0.4427 N: 3784	x̄: 1.238 Min: 0.9919 Max: 1.566 σ: 0.08371 N: 3784
Passed	x̄: 90.54 Min: 90.39 Max: 90.93 σ: 0.03111 N: 3532	x̄: 3.441 Min: 3.144 Max: 3.822 σ: 0.1255 N: 3532	x̄: 132.3 Min: 130.8 Max: 134.1 σ: 0.4208 N: 3532	x̄: 1.247 Min: 1.116 Max: 1.504 σ: 0.07449 N: 3532
Limits	[87.39 .. 93.39] (3784)	[3.132 .. 3.829] (3784)	[112.3 .. 151.9] (3784)	[1.116 .. 1.509] (3784)

| **Filter by date/time range** | Based on the first example (created from scratch) we'll now modify the date/time range of the statistics. |

There are several possibilities to specify the date range.

1. Single date notation to specify the start date, e.g. "20140725"

2. Date range notation, e.g. "20140725-20140730"

3. Short notation

This tutorial focuses only on the date/time range specification. For a short notation example, please refer to the section *Daily statistics* or to specification S35.

Have a look at the timestamps of summary log file located in Log_2, it contains measurements from 2014-08-01 .. 2014-08-04. Let's say we just want to analyze the data produced 2014-08-02 between from 8:30 till noon. (Log_1 contains timestamps of July, 25th, which are of no interest and filtered anyway.)

Filter	
Date filter	20140802-20140802
Time filter	8:30-12

The specified date/time range is displayed for checking the correct interpretation of the parameters.

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Date/Time Begin	2014-08-02 08:30:00:0
Date/Time End	2014-08-02 12:00:00:0
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statistics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	90.95	100.00	96.67	100.00	91.90	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Valid	210	210	210	210	210	210	210	210	210	210	210	210
Pass	191	210	203	210	193	210	210	210	210	210	210	210
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	19	0	7	0	17	0	0	0	0	0	0	0

Single value statistics

	Level	Re	Fs	Qts
All	x̄: 90.54 Min: 90.53 Max: 90.54 σ: 0.002782 N: 210	x̄: 3.424 Min: 3.076 Max: 3.908 σ: 0.1534 N: 210	x̄: 132.5 Min: 131.2 Max: 133.4 σ: 0.4066 N: 210	x̄: 1.238 Min: 1.029 Max: 1.529 σ: 0.09014 N: 210
Passed	x̄: 90.54 Min: 90.53 Max: 90.54 σ: 0.00278 N: 191	x̄: 3.44 Min: 3.162 Max: 3.79 σ: 0.1335 N: 191	x̄: 132.5 Min: 131.5 Max: 133.4 σ: 0.4 N: 191	x̄: 1.248 Min: 1.116 Max: 1.5 σ: 0.07832 N: 191
Limits	[87.39 .. 93.39] (210)	[3.132 .. 3.829] (210)	[112.3 .. 151.9] (210)	[1.116 .. 1.509] (210)

Filter by operator

The log file contains different users. For analyzing the results of certain users, specify the users separated by line feed.

File   Edit   View
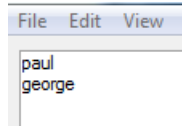
paul
george

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Date/Time End	2016-03-15 10:19:37:2
Operators	paul george
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statistics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	93.18	100.00	99.07	100.00	93.54	100.00	100.00	100.00	99.93	99.93	99.93	100.00
Valid	1496	1501	1501	1501	1501	1501	1501	1501	1500	1500	1500	1495
Pass	1394	1501	1487	1501	1404	1501	1501	1501	1499	1499	1499	1495
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	102	0	14	0	97	0	0	0	1	1	1	0
Faulty	5	0	0	0	0	0	0	0	1	1	1	6
Rate (%)	0.33	-	-	-	-	-	-	-	0.07	0.07	0.07	0.40
Noise	5	0	0	0	0	0	0	0	1	1	1	6

Single value statistics

	Level	Re	Fs	Qts
All	x̄: 90.53 Min: 90.39 Max: 90.93 σ: 0.0478 N: 1496	x̄: 3.425 Min: 3.026 Max: 3.927 σ: 0.1344 N: 1496	x̄: 132.3 Min: 123.8 Max: 134.1 σ: 0.4933 N: 1496	x̄: 1.235 Min: 1.004 Max: 1.56 σ: 0.08144 N: 1496
Passed	x̄: 90.53 Min: 90.39 Max: 90.93 σ: 0.04733 N: 1394	x̄: 3.439 Min: 3.151 Max: 3.822 σ: 0.1228 N: 1394	x̄: 132.3 Min: 130.8 Max: 134.1 σ: 0.4416 N: 1394	x̄: 1.244 Min: 1.116 Max: 1.502 σ: 0.07272 N: 1394
Limits	[87.39 .. 93.39] (1496)	[3.132 .. 3.829] (1496)	[112.3 .. 151.9] (1496)	[1.116 .. 1.509] (1496)

Filter by SN-prefix

To analyze only one SN prefix, just enable the SN prefix definition and enter the prefix in the SN filter:

define SN prefix	☑	
SN prefix	abc	

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Date/Time End	2016-03-15 10:22:10:9
SN Prefix	abc
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statistics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	92.09	100.00	98.51	100.00	92.61	100.00	100.00	100.00	99.96	99.96	99.96	100.00
Valid	2416	2421	2421	2421	2421	2421	2421	2421	2420	2420	2420	2415
Pass	2225	2421	2385	2421	2242	2421	2421	2421	2419	2419	2419	2415
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	191	0	36	0	179	0	0	0	1	1	1	0
Faulty	5	0	0	0	0	0	0	0	1	1	1	6
Rate (%)	0.21	-	-	-	-	-	-	-	0.04	0.04	0.04	0.25
Noise	5	0	0	0	0	0	0	0	1	1	1	6

Single value statistics

	Level	Re	Fs	Qts
All	x̄: 90.52 Min: 90.39 Max: 90.56 σ: 0.02463 N: 2416	x̄: 3.423 Min: 3.026 Max: 3.927 σ: 0.1422 N: 2416	x̄: 132.4 Min: 123.8 Max: 134.1 σ: 0.4494 N: 2416	x̄: 1.234 Min: 0.9919 Max: 1.566 σ: 0.08489 N: 2416
Passed	x̄: 90.52 Min: 90.39 Max: 90.56 σ: 0.02452 N: 2225	x̄: 3.439 Min: 3.144 Max: 3.822 σ: 0.1277 N: 2225	x̄: 132.4 Min: 130.8 Max: 134.1 σ: 0.4147 N: 2225	x̄: 1.244 Min: 1.116 Max: 1.504 σ: 0.0746 N: 2225
Limits	[87.39 .. 93.39] (2416)	[3.132 .. 3.829] (2416)	[112.3 .. 151.9] (2416)	[1.116 .. 1.509] (2416)

Filter by SN

Let's say you want to analyze the serial numbers def0000 until def1000:

define SN prefix	☑
SN prefix	def
SN start value	0
SN end value	1000

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Date/Time End	2016-03-15 10:33:06:7
SN Prefix	def
SN Begin	0
SN End	1000
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statististics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	95.00	100.00	98.90	100.00	95.10	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Valid	1001	1001	1001	1001	1001	1001	1001	1001	1001	1001	1001	1001
Pass	951	1001	990	1001	952	1001	1001	1001	1001	1001	1001	1001
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	50	0	11	0	49	0	0	0	0	0	0	0

Single value statistics

	Level	Re	Fs	Qts
All	$\bar{x}$: 90.55 Min: 90.53 Max: 90.57 σ: 0.00663 N: 1001	$\bar{x}$: 3.433 Min: 3.068 Max: 4.023 σ: 0.135 N: 1001	$\bar{x}$: 132.3 Min: 130.9 Max: 133.5 σ: 0.4196 N: 1001	$\bar{x}$: 1.247 Min: 1.039 Max: 1.56 σ: 0.08235 N: 1001
Passed	$\bar{x}$: 90.55 Min: 90.53 Max: 90.57 σ: 0.006612 N: 951	$\bar{x}$: 3.443 Min: 3.151 Max: 3.808 σ: 0.1233 N: 951	$\bar{x}$: 132.3 Min: 130.9 Max: 133.5 σ: 0.4189 N: 951	$\bar{x}$: 1.253 Min: 1.116 Max: 1.5 σ: 0.07438 N: 951
Limits	[87.39 .. 93.39] (1001)	[3.132 .. 3.829] (1001)	[112.3 .. 151.9] (1001)	[1.116 .. 1.509] (1001)

CSV export

It is possible to export a CSV file for import in any 3rd party statistics software (e.g. MS Excel).

Apply the desired filters and specify a path for the CSV file.

Filter	
Date filter	
Operator	RingoUser
define SN prefix	☐
SN start value	
SN end value	
Ignore SV	NI_Runs
Export	
CSV-File	my_data.csv

Configuration

Option	Setting
Folder	C:\temp\AN48_YieldStatistics
Export File	C:\temp\AN48_YieldStatistics\my_data.csv
Date/Time End	2016-03-15 10:36:10:3
Operators	Ringo User
Ignored SV	NI_Runs

Statistics: "*AN48_YieldStatistics*"

Verdict statistics

	Overall	Imp	Re	Fs	Qts	Resp	Level	Pol	Thd	Harm2	Harm3	Rbz
Yield (%)	94.06	99.52	98.85	99.62	95.31	99.81	100.00	99.81	99.81	99.81	99.90	98.85
Valid	1043	1045	1045	1045	1045	1045	1045	1045	1045	1045	1045	1043
Pass	981	1040	1033	1041	996	1043	1045	1043	1043	1043	1044	1031
Warning	0	0	0	0	0	0	0	0	0	0	0	0
Fail	62	5	12	4	49	2	0	2	2	2	1	12
Faulty	2	0	0	0	0	0	0	0	0	0	0	2
Rate (%)	0.19	-	-	-	-	-	-	-	-	-	-	0.19
Noise	2	0	0	0	0	0	0	0	0	0	0	2

Single value statistics

|	Re	Fs	Qts	Level
All	x̄: 3.42 Min: 0.6148 Max: 4.023 σ: 0.1617 N: 1043	x̄: 132.6 Min: 130.2 Max: 372.5 σ: 7.866 N: 1043	x̄: 1.234 Min: 0.08266 Max: 1.56 σ: 0.09551 N: 1043	x̄: 92.4 Min: 90.53 Max: 114.6 σ: 6.372 N: 1043
Passed	x̄: 3.432 Min: 3.154 Max: 3.808 σ: 0.126 N: 981	x̄: 132.2 Min: 130.4 Max: 133.5 σ: 0.5344 N: 981	x̄: 1.243 Min: 1.068 Max: 1.5 σ: 0.0803 N: 981	x̄: 92.18 Min: 90.53 Max: 114.6 σ: 6.022 N: 981
Limits	[2.955 .. 3.612] (81) [3.132 .. 3.829] (962)	[111 .. 150.1] (81) [112.3 .. 151.9] (962)	[0.9283 .. 1.256] (81) [1.116 .. 1.509] (962)	[111.6 .. 117.6] (81) [87.39 .. 93.39] (962)

CSV successfully exported

The resulting csv file contains data from all parsed summary log files with active operator filter ("User" and "Ringo").

The file may be imported into any spreadsheet software. The column separator must be defined as tabulator.

Using charts

Every single value may be visualized optically by distribution charts and time course charts. From the single value statistics of the previous examples you know that we have the following single values available: Re, Fs, Qts and Level. In this example we only analyze the folder "Log_2".

Let's plot and optimize distribution and time course charts. First we define distribution and time course plots for every single value:
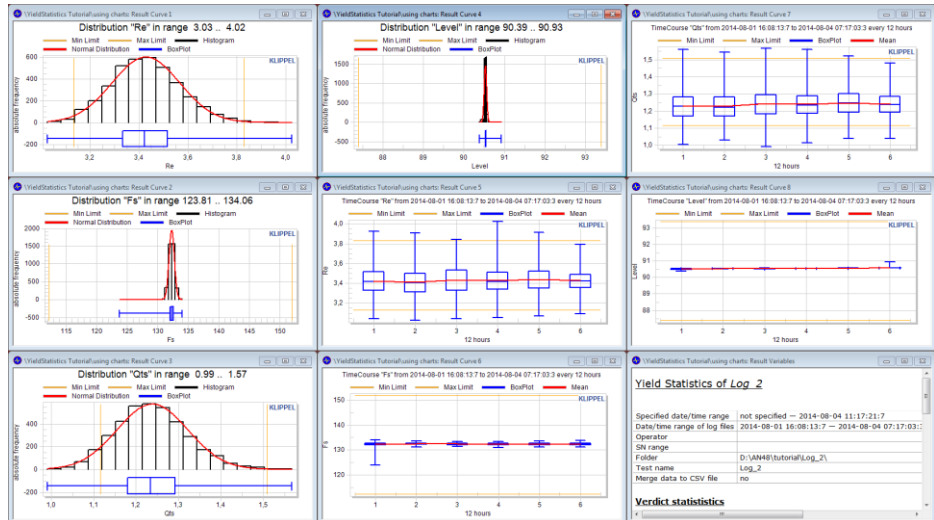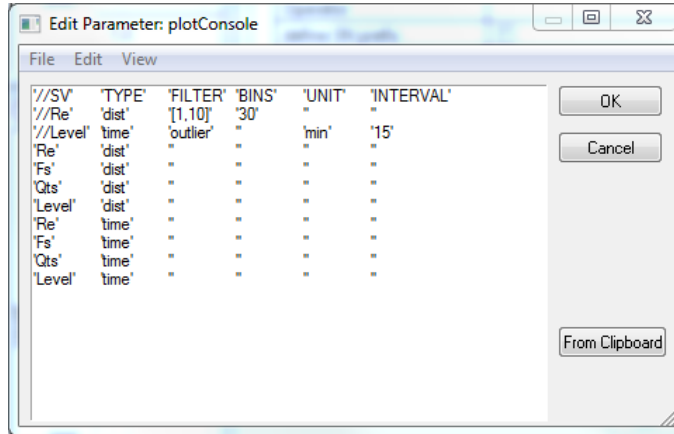

Note: outliers and invalid measurements may result in strange plots due to high result ranges. An example: The distribution plot of Re may be destroyed by not connected or shortened measurements (resulting in very high or low Re values). Please refer to the documentation on how to apply filters for the plots.

Tutorial: Integration

Integration into QC-Start and dB-Lab

The toolbars of QC-Start and dB-Lab are predestinated for integration of custom tools.
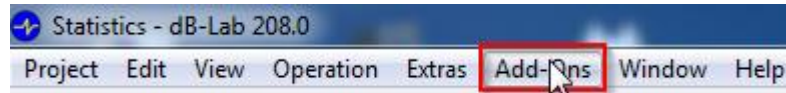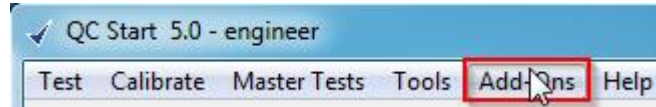
The release of QC5 already includes an integration of a simple statistics via the toolbar. Let's have a look at the tool definition:

```
[YieldStatistics]
Title=YieldStatistics
Run=wscript.exe
Params=//nologo .\YieldStatistics_Tool_files\YieldStatistics_Tool.vbs
/srcpath:"{Examples}\Statistics.kdbx" /srcnodepath:"Statistics\CAL
YieldStatistics" /dstpath:"{DBDir}\{DBTitle}_Yield.kdbx"
Comment=This tool creates the YieldStatistics for this test.
Wait=0
WorkingDir={AppData}\ToolInfo
AppFilter=QCStart-Expert,dBLab
```

Let's create a new Add-on, that plots the Re distribution and analyzes only data from the last day. Edit the file "YieldStatistics_Tool.kltoolinfo.ini" in the toolinfo folder (Application Data) and duplicate the content.

```
[YieldStatistics_LastDay_with_Re]
Title=YieldStatistics (last day with Re distribution)
Run=wscript.exe
Params=//nologo .\YieldStatistics_Tool_files\YieldStatistics_Tool.vbs
/srcpath:"{Examples}\Statistics.kdbx" /srcnodepath:"Statistics\CAL
YieldStatistics_last_day" /dstpath:"{DBDir}\{DBTitle}_Yield.kdbx"
Comment=This tool creates the YieldStatistics for this test.
Wait=0
WorkingDir={AppData}\ToolInfo
AppFilter=QCStart-Expert,dBLab
```

The tool is now available, but not yet working.
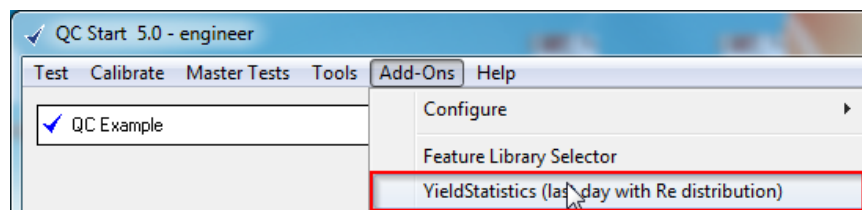
Now we've added a new Add-on that still executes the VBS, but selects a different template operation. The next thing to do is to create the template operation. Locate the statistics database in <AppData>\Examples and duplicate the existing operation.
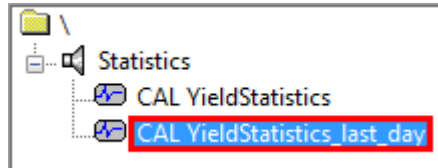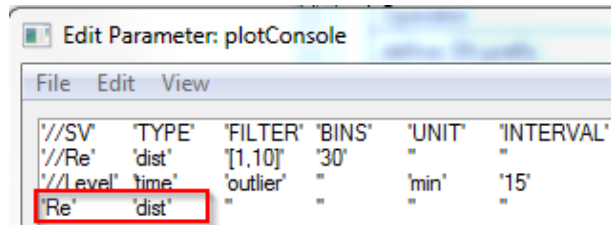

Be sure to name it exactly as specified in the tool definition.

Modify the input parameters of that operation so that all data from the last 24h are analyzed:

Filter	
Date filter	D-

Edit the parameter "Edit plots" to generate a simple distribution plot of Re.

Note: It's a good idea to arrange the windows "HTML out" and "Distribution of Re" optically attractive and save the window configuration.

Select a test in QC-Start where you surely have some log data of Re in the last 24h available and start the new tool. A new database should be opened with the newly produced statistics.

Daily statistics

This example demonstrates a daily statistics triggered by the Windows Scheduler.

Prepare a template operation

Prepare a database that contains a template operation with the date/time specification "D-" (defining the last 24h as the date/time range of interest. Name the operation's path accordingly. You can configure the operation from scratch or copy an existing operation.
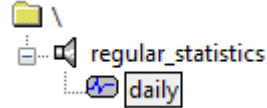
For a daily statistic, it's convenient to choose "D-" for date notation (or "D", for the current day, if the statistic shall be produced at the end of a day). Find more information about short notations in specification S35.

Filter	
Date filter	D-

If the daily reports should contain any plots, this would be the place to define them.

Windows scheduler triggers a VBS script (AddStatistic.vbs) that runs the daily statistics. The VBS is executed with the script host cscript or wscript. Depending on your operating system choose the correct cscript.exe to start the script:

- `C:\Windows\System32\cscript.exe` for 32 Bit systems and

- `C:\Windows\SysWOW64\cscript.exe` for 64 Bit systems.

The example in this application note uses a batch wrapper for determining the correct version of cscript.

You can test the batch file manually by executing it multiple times. The database should then contain multiple operations named with a timestamp. If there are no log files in the folder, the results won't be very exciting.

The following files could be found by extracting the "tutorial_daily_statistics":
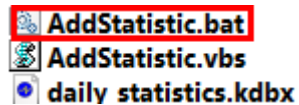
Arguments of the VBS file

If you look at the batch file, you see that the VBS script is called with one argument (daily_statistics.kdbx) determining the location of the template operation and the destination of the statistic operations. The second and third arguments are optional.

ARG1: Specification of the used database, it is mandatory.

ARG2: Path of template operation, if not defined, the VBS uses the default path "\template\daily"

ARG3: Target operation path. If not defined, the VBS names the operations after a timestamp of execution in the object "Statistics".
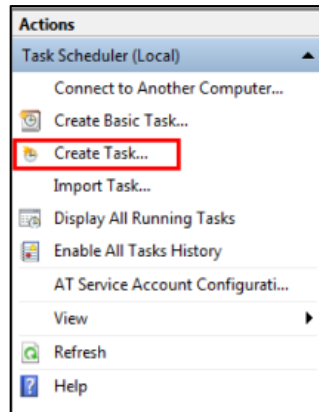
Add Windows Scheduler Task

This command could then be fed into the Windows Task Scheduler, which is located in Control Panel ➔ Administrative Tools ➔ Task Scheduler.
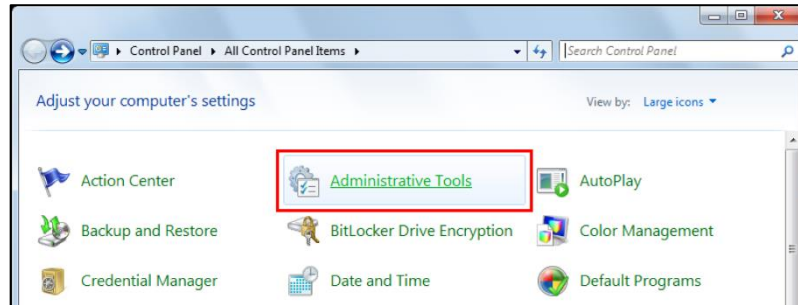
Create a new Task:

Select the desired trigger and set the batch file as execution command. Be sure to have daily log files available at the defined location (if no location is defined in the template operation, the log files are searched in the database's location.)

Trigger after a test session

Another possibility is the usage of klafter.bat which is a batch file executed after one logs out from a QC test. Please refer to the QC manual section *Pre- and post-processing of batch commands*.

Adding the trigger for the statistics to klafter will run the statistics after each logout.

Semi-Online statistics – regularly updated

A semi-online statistic runs parallel to the QC process (that produces the log files) and is updated on a regular basis. The statistic can run on the same or on any other computer with access to the produced log files. This example assumes, that the statistic runs parallel to the QC process on the same computer.

Strategy:

- The QC process writes the log data into the Summary-log files. Each measurement appends a row.

- Parallel to the QC process another database is opened that runs a set of operations in loop mode. The looped operations comprise the statistic module and a pause:
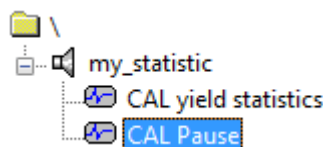
Statistic operation

The statistic operation may be configured with all available parameters (explained in this application note). The example database comes with a statistic operation configuring Chart 1 as distribution plot of the measure *Fs*. Date and time is not restricted in the example.

Pause operation

The pause operation is used to display the statistic results for a certain amount of time before a new run of the statistic is performed. Additionally, the pause operation executes a batch file that organizes the Summary-Log files in order to optimize the performance for the yield statistic calculation.

Background

The QC system changes the Summary-Log files when adding a row for the results of every single measurement, but the *YieldStatistics* converts a Summary-Log file to binary format.

Before using the binary data files on subsequent runs, the *YieldStatistics* checks the consistency of the Summary-Log files and the corresponding binary file(s). If a file has changed, the binary data is discarded and the file is parsed again. If the consistency check reveals that the Summary-Log did not change, the binary data can be used without any parsing of the Log file.
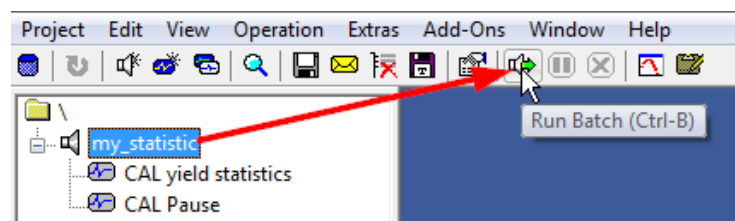
The Pause operation copies the Summary log files to a separate location (*Log_Archive*). If the Summary-Log files reached a certain size, the file is moved to the separate location. The QC system creates a new file for the next measurement and the previous ones don't change (hence the binary data may be used).

Installation

- Install QC v5.x

- unpack the archive "semi_online_statistics.zip"

- Copy the database *semi_online_statistic.kdbx* and the batch file *copy_Summary_if_bigger.bat* to the QC test folder
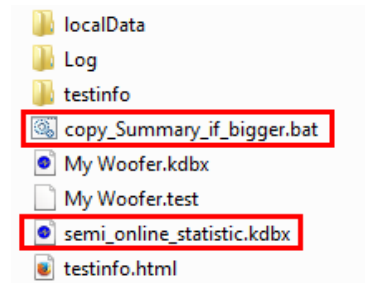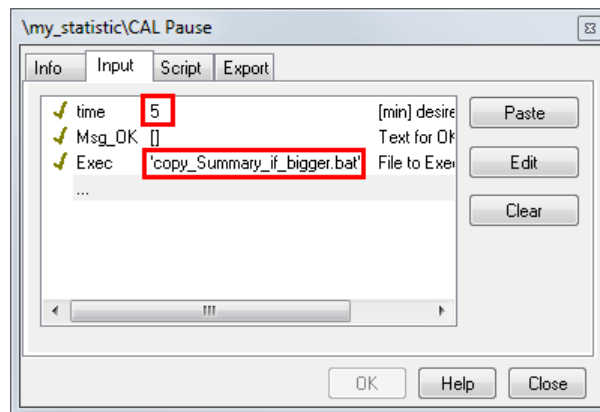

- Produce some Summary-Log information (*Log* folder) by starting the test several times

- Open the database *semi_online_statistic.kdbx*, select the object *my_statistic* and start the batch run with an infinite number of repeats

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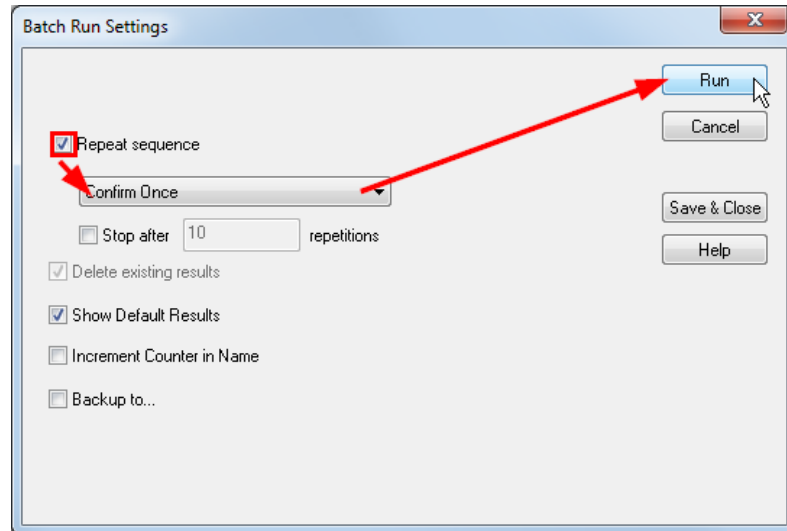
In the delivered example, the statistic is updated every 5 minutes (parameterized by the *Pause* operation).

If its size exceeds 0.5 MB, a Summary-Log file is moved (parameterized by the batch file).

```
SET /a SIZELIMIT=500*1024
SET LogDir=Log
SET LogArchive=%LogDir%\Log_Archive
```

Note: If the Pause operation does not show the parameter *Exec*, please install the *pause.klpack* which delivers the corresponding CAL script.


More Applications

Single Test	A comprehensive example for a single test is given in the example above.
	You may also specify an alternative name for the analysis and overwrite the internally used test name.
Yield of multiple tests	Basically all combinations of tests may be analyzed, as long as the summary log files (or the complete log folder) are grouped in one folder structure.
	Note that the *summary*.log* files need to be copied / grouped only.
Yield of one production line	Simply specify the QC data root folder for the statistics. This will calculate the yield of the whole production on this computer.
Yield of factory	Recursively copy all *summary*.log* files from all lines to one network drive.
	Specify the top folder for the statistics. Note, that all *summary*.log* files may be located in one single folder (flat hierarchy).
Yield of operator	Restricting data by operator allows counting tests and calculating the yield rate for one or more operators. Note that an operator that found many bad drivers (with lower yield rate) may be a better one than one with 100% yield (uncritical testing).
Yield of last week / month / quarter / year	Frequently requested analysis is a time restriction of an elapsed period of time. To avoid annoying change of setup, use the shortcut input for date / time using the "-" postfix:
	{H-, D-, W-, Q-, M-, Y-} will analyze the time span from NOW minus specified type of period.
	Note that this is different from the last complete time span, such as last whole week from Monday till Sunday. For this mode use the number postfix (see below). Example: Y- will analyze all data within the elapsed year from NOW on.
Yield of specified week / month / quarter / year	A simple time restriction allows the analysis of numbered periods of time. To avoid entering long date specifications, use the shortcut input for date / time using the *numbered* postfix:
	{H, D, W, Q, M, Y}{number} will analyze the data within the {number} occurrence of the time span.
	Example: Y2011 will analyze all data within the year 2011.
Yield of Serial Number range	Simply specify a numerical range of serial numbers to analyze a special batch of production or use just a serial number prefix. This filter can be combined with all other restrictions.

Yield in a QC template

The *YieldStatistics* module can be included in templates: Open a database, that contains a QC operation and add a CAL operation (be sure, that you are logged out from Operator/Engineer/Programmer mode). See above (Requirements/Installation) for more detailed information about including the CAL operation.
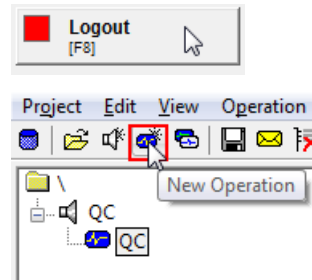
Then close dB-Lab and save the test as template.
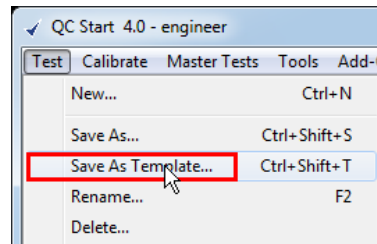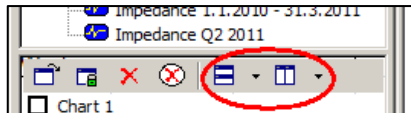

Compare Statistics

Multiple statistics can be created in parallel to easily compare e.g. quarters.

Duplicate the operation (Ctrl-D) or icon

and restrict the data in a different way. Run both operations.

Double click on the operations you wish to compare and arrange / tile open windows using the icons below. You may need to close all open results before.


Post processing using 3rd party software

For analysis using 3rd party statistics software such as Excel, all (restricted) data can be stored optionally in an open *.csv* file. This way all data from multiple *summary*.log* files is written into one single *.csv* file for easy interfacing.

Simply specify the CSV output file name or the full path.

Comparing output and graphical representations are easy to achieve.

Using Excel Macro language (semi) automatic processing using Klippel Automation and controlling the CAL operations is possible.
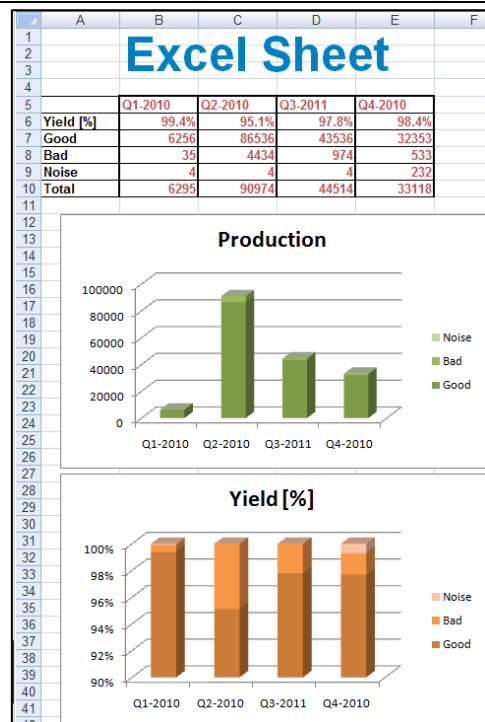
Reports	All results can be exported into a nicely formatted *html* report. Company logo and other additional information can be added. Such reports can be printed or stored as reference. Please refer to the manual "dB-Lab / dB-Lab Reference / The Report System" for more information.

Further reading

Automation	Explore possibilities of the automation (example script at the end of the document) **Specification S12 Automation**
Automated reports	Explore possibilities to create automated reports out of the *YieldStatistic* module. **Application Note AN 44 Creating Automated Reports**

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