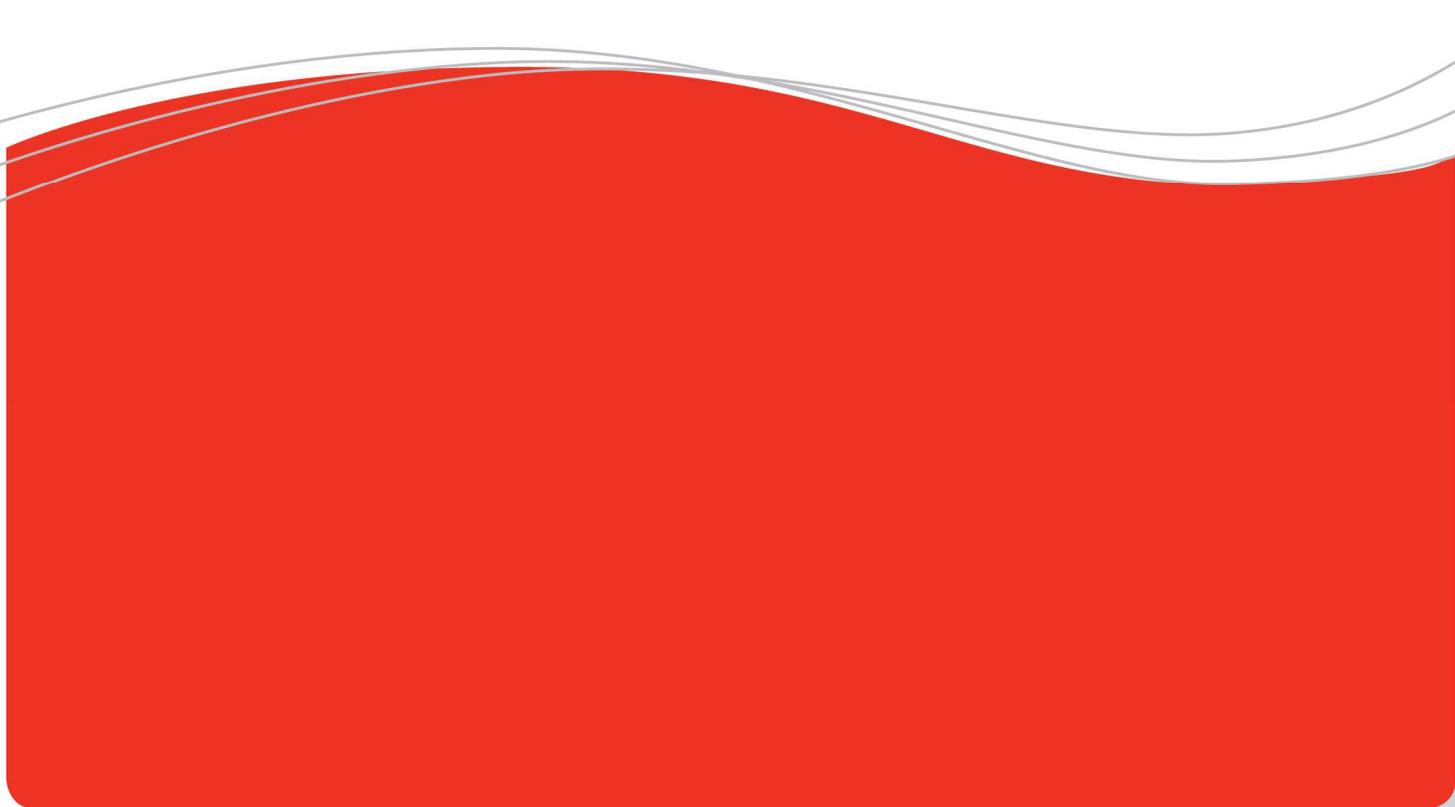# From Quality Control To Quality Improvement

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From Quality Control To Quality Improvement

How to use SPC in the Analyze phase of a DMAIC implementation

Everybody is familiar with control charts for quality control. An example of a control chart in shown above. With a good SPC program you can easily make the step from quality control to quality improvement.
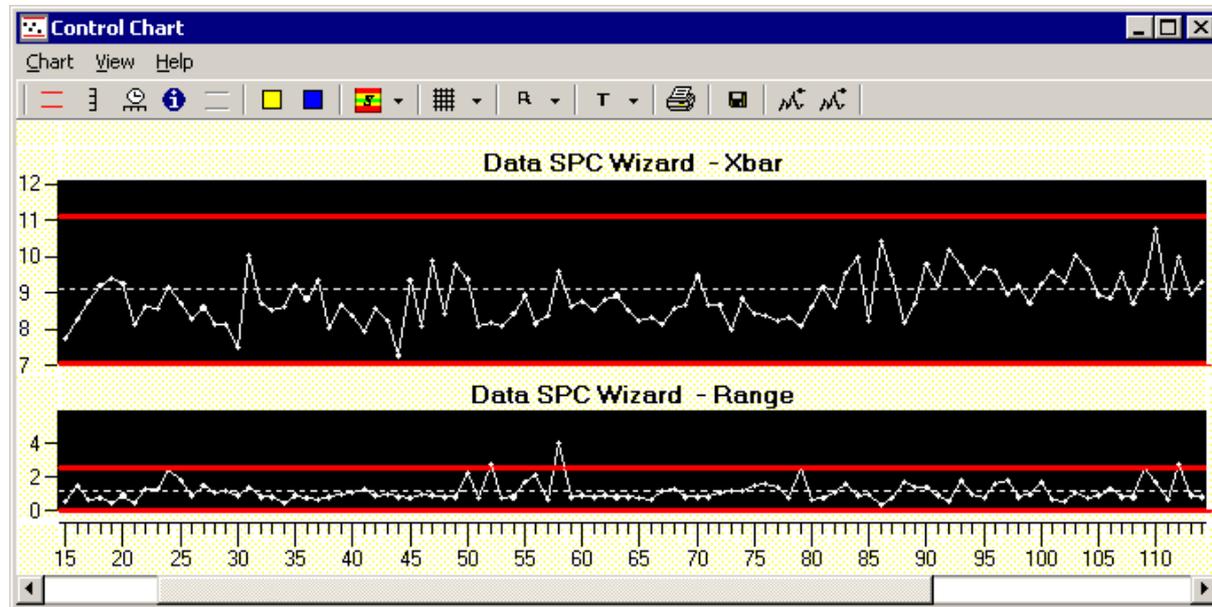
The first step is to add extra information columns in your data. These could be columns for tracking and tracing like operator, lot number, batch number etc. Other columns could be sources of variation like process parameters, machine batch numbers, temperature, humidity etc.

In the example below you see the batchnr and the materialnumber added to the table of measurements.

F Test example (Memory Table)

Table Data View Help

New row	With Instr.	Continuous	Edit	Print	Insert	Delete	Exclude	Copy	Paste

Subgroup	DataLyzer data (1)	DataLyzer data (2)	DataLyzer data (3)	DataLyzer data (4)	DataLyzer data (5)	Batchnr	Materialnr	Date / time	Note
2	8.9	9.7	8	8.5	8.4	5007	ABC12	5/11/2000 9:35:38 AM	
3	7.5	7.7	7.8	8	7.6	5007	ABC12	5/11/2000 10:42:04 PM	
4	8.7	8.8	7.5	7.9	7.8	5007	ABC12	5/13/2000 2:49:54 AM	
5	9.6	10.5	9.8	9.6	9.2	5007	ABC12	5/13/2000 7:30:43 AM	
6	8.9	9.7	10	11.5	9.8	5007	ABC12	5/13/2000 8:59:36 PM	
7	9.3	9.5	9.4	9	9.2	5007	ABC12	5/15/2000 7:31:09 AM	
8	8.3	8.6	8.3	8.2	8.7	5007	ABC12	5/15/2000 8:20:32 PM	

The control chart shows us when the process is out of control, but we can also use the same measurements to analyse if there are differences in the process between different settings or different material batchnumbers.

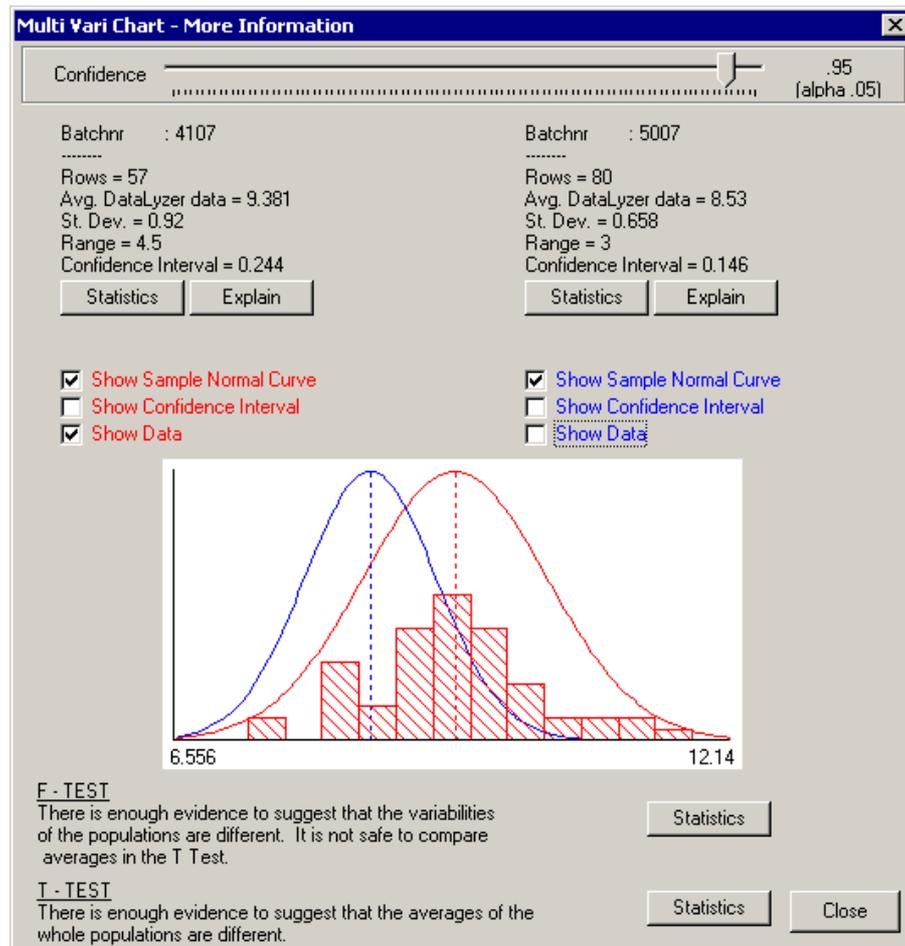One way to perform this analysis is to use a multi vari chart (below is an example of a multi vari chart).
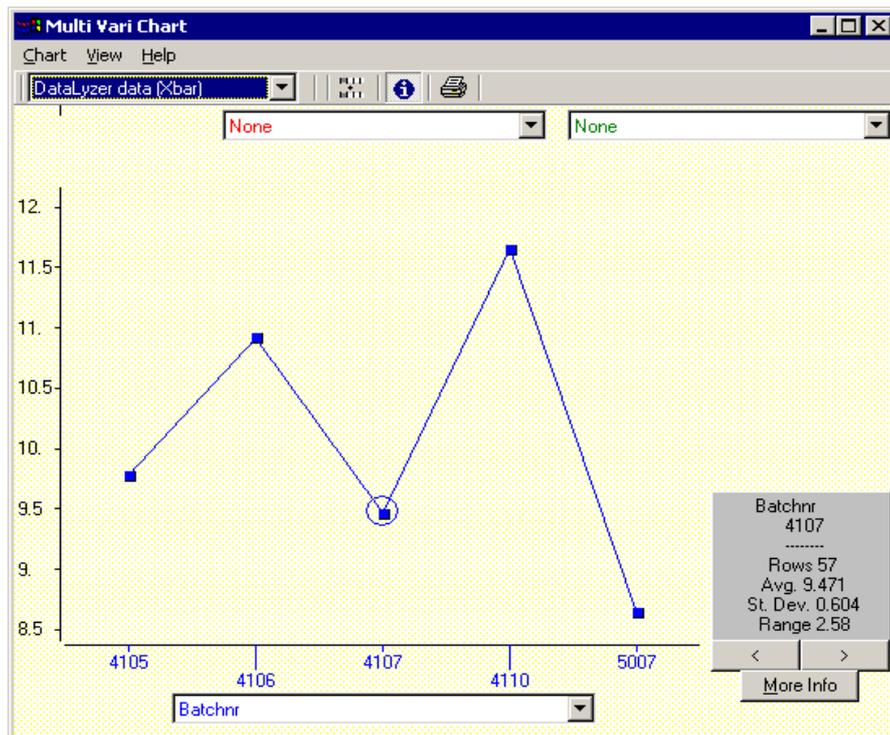
We can see for example that the average of batchnr 4107 is higher than the average for batchnr 5007. The obvious question is whether this is a significant difference or just random variation.

To compare the averages of 2 data sets we need to perform a T test, but first you need to check if the 2 datasets are coming from a normal distribution and if the variability of the 2 datasets is more or less the same (F test).

In the example the F and T tests are calculated for the two selected datasets and show the actual data in the form of a small histogram superimposed on a standard normal curve. This allows us to check the data for normality (see screen shot below).

After the analysis you can change the confidence level on the slider at the top of the screen to get a better understanding about the level of confidence of your statement.

Multi Vari Chart - More Information

Confidence   .95   (alpha .05)

Batchnr : 4107	Batchnr : 5007
Rows = 57	Rows = 80
Avg. DataLyzer data = 9.381	Avg. DataLyzer data = 8.53
St. Dev. = 0.92	St. Dev. = 0.658
Range = 4.5	Range = 3
Confidence Interval = 0.244	Confidence Interval = 0.146
Statistics Explain	Statistics Explain

☑ Show Sample Normal Curve   ☑ Show Sample Normal Curve
☐ Show Confidence Interval   ☐ Show Confidence Interval
☑ Show Data   ☐ Show Data

6.556   12.14

F - TEST
There is enough evidence to suggest that the variabilities of the populations are different. It is not safe to compare averages in the T Test.   Statistics

T - TEST
There is enough evidence to suggest that the averages of the whole populations are different.   Statistics   Close

The method above shows a very quick and effective way to make the step from quality control to quality improvement.

For further information:
www.datalyzer.com