Lean Tool Information Sheet

What is … Statistical Process Control (SPC)

Statistical Process Characterisation & Control (SPC) – Perfect Quality

What is Statistical Process Characterisation and control and how will it help my workplace?

The purpose of this program is to introduce participants to phases of process characterisation using common statistical techniques and problem-solving methodologies.

- ✓ Develop a histogram and check for normality
- ✓ Calculate standard deviation, mean Cp and Cpk to quantify the ability of the process to respond to the customer's specifications.
- ✓ Develop Pareto diagrams, cause & effect diagrams, conduct Multi-vary analysis to optimise a process
- ✓ Develop variable and attribute control charts to monitor a process

SPC is a method of monitoring a process during its operation in order to control the quality of the products while they are being produced, rather than relying on inspection to find problems after the fact. It involves gathering information about the product, or the process itself, on a near real-time basis so that the operator can take action on the process. This is done in order to identify special causes of variation and other non-normal processing conditions, thus bringing the process under statistical control and reducing variation.

Identify the 4 Phases of process characterisation

- ✓ Phase I – Definition
- ✓ Phase II – Analysis
- ✓ Phase III – Optimisation
- ✓ Phase IV – Control

Develop Histograms and Check for Normality

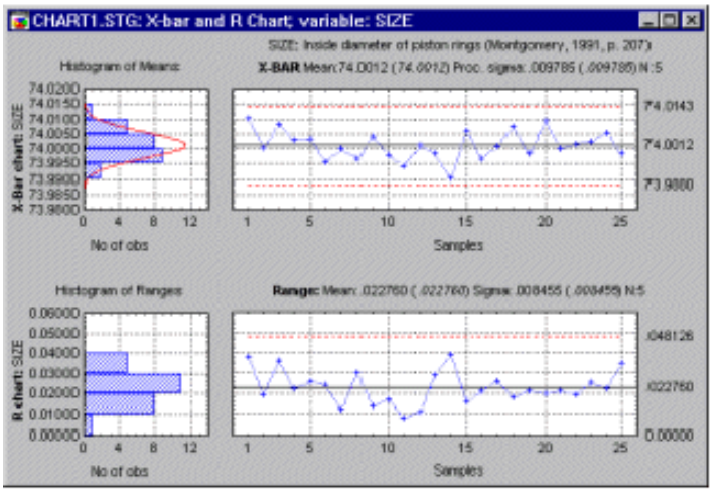
- ✓ A graphic representation of the distribution of data
- ✓ A quick view of the amount of variation in a process

Understand and calculate standard deviation

- ✓ Cp & Cpk
- ✓ Learn mean, sigma and capability indices

Pareto diagrams, C&E diagrams, Multi-vary Analysis

- ✓ 80-20 rule, fishbone charts, observation and recording



SPC is the key to process stability

Key Points & Outcomes:

- ✓ Data collection, Histograms, Multi-vary Analysis, Pareto Diagrams, Process capability study, Scatter diagrams, Control charts

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Statistical Process Control (SPC)

The very definition of quality came from the earliest quality gurus, who were statisticians. Walter Shewhart is often called "the father of statistical process control (SPC)" and inspired many others to utilise the power of data and statistics in quality control.

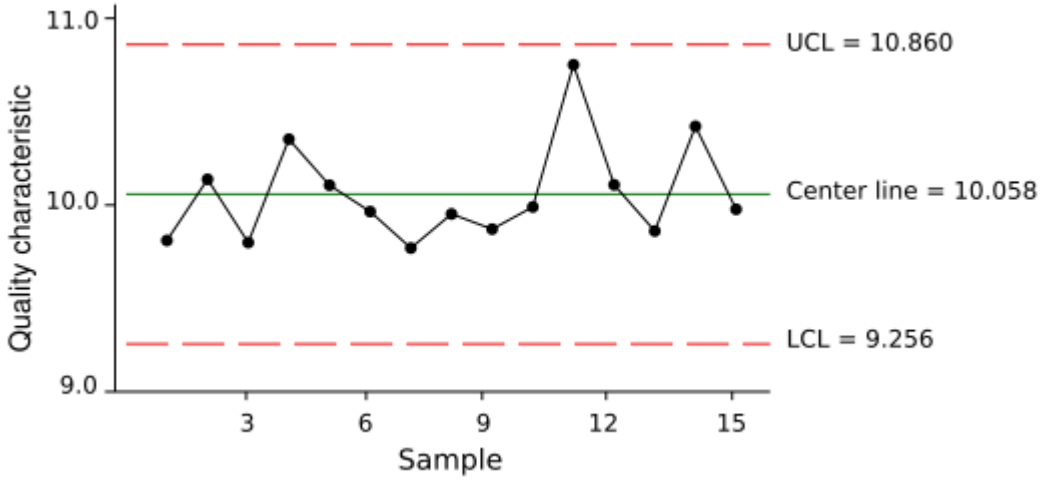
Before Shewhart joined Bell Telephone in 1918, the quality system involved inspection and the removal of defective parts. When defective parts (output) were found, adjustments would be made to the production process (inputs) to try and reduce the defects. Shewhart applied his statistical knowledge to production and argued against the accepted process – he argued that continually changing the production process in reaction to defects did not improve quality, and in many cases actually made it worse.

Shewhart's reasoning was that the defects were being caused by variation in the manufacturing process and that this variation can be put into two categories:

- ✓ assignable [special] cause – variation due to specific special reasons
- ✓ chance [common] cause – even, predictable variation due to natural probability. Also called "noise".

Common cause variation can be statistically modelled by a mean (average value) and standard deviation (variation). If you continually change the production process (inputs), all you may be doing is moving the average value and not taking into account the natural variation, hence may be making the situation (output) worse.

To introduce Statistical Process Control (SPC), Shewhart invented the control chart, which allowed the statistical variation in a process to be visualised and understood, hence giving a new level of clarity to the understanding of quality.



Control Chart source = Wikipedia

Today, almost 100 years later, control charts are the tool that is used to monitor all types of systems, in manufacturing and in other industries. After setting up a control chart, the monitoring of the process does not require skill or statistics knowledge – shop floor staff can plot data and only raise the alarm when the plot shows an abnormal result. This abnormal result is likely to be a "special cause", which must be investigated and understood.

Six-Sigma trained professionals are the ideal people to analyse and understand the variation in a process and use Statistical Process Control (SPC) to consistently deliver a high-quality predictable outcome.