



Statistical Process Control

- ◆ **Statistical Process Control (SPC)**

- monitoring production process to detect and prevent poor quality

Control Charts

The *control chart* is a statistical quality control tool used in the monitoring variation in the characteristics of a product or service

What is a control chart?

1-The control chart is a graph used to study how a process changes over time. Data are plotted in time order.

2-A control chart always has a central line for the average, an upper line for the upper control limit and a lower line for the lower control limit.

3-Lines are determined from data. By comparing current data to these lines, you can draw conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation).

When to use a control chart?

1-Controlling ongoing processes by finding and correcting problems as they occur.

2-Predicting the expected range of outcomes from a process.

3-Determining whether a process is stable (in statistical control).

4-Analyzing patterns of process variation from special causes (non-routine events) or common causes (built into the process).

5-Determining whether the quality improvement project should aim to prevent specific problems or to make fundamental changes to the process.

Basic Procedure of Control Chart

- Choose the appropriate control chart for the data.
- Determine the appropriate time period for collecting and plotting data.
- Collect data, construct the chart and analyze the data.
- Look for “out-of-control signals” on the control chart. When one is identified, mark it on the chart and investigate the cause. Document how you investigated, what you learned, the cause and how it was corrected.
- Continue to plot data as they are generated. As each new data point is plotted, check for new out-of-control signals.

Basic components of control charts

- A centerline, usually the mathematical average of all the samples plotted;
- Lower and upper control limits defining the constraints of common cause variations;
- Performance data plotted over time

Types of charts

1-Variables

- Control charts for variables are used to monitor characteristics (measurable quantities), e.g. weight, length and temperature etc.**

Mean control charts \bar{x} – chart

To check mean

Range control charts R-chart

To check variability

2-Attributes

Control charts for attributes are used to monitor characteristics e.g. % defective, number of flaws , number of broken etc.

p-charts

To check proportion of defectives.

c-charts

To check the number of defectives.