Control control limit (lcl) represent the boundaries of

Psychology, Behaviorism

Control charts are widely used tools ofstatistical quality control in industrial environments since its inception byShewart in 1920’s. The major function of control charting is to detect theoccurrences of assignable causes so that the necessary corrective action may betaken before large quantity of non conforming product is manufactured. A surveyconducted by Saniga and Shirland (1977) shows that on continuous measurementscale the control chart for averages dominates the use of any other controlchart technique. All control charts have a common structure. A plot of theresult of repeated sampling is made on a vertical scale against the number ofsamples plotted horizontally.

The center line of the chart represents a longterm average of the process statistic or its standard value. The upper control limit(UCL) and Lower control limit (LCL) represent the boundaries of typicalstatistic variation. The process call for adjustment if the points fall outsidethe control limits.

Departures from expected process behavior within the limits(non random patterns on the chart) can be detected by using different run testsfor pattern recognition (Nelson (1985)). On using control charts two kinds oferrors may occur: over adjustment and under adjustment. Uncertainty ofinferences based on sampling statistic is the major cause for these errors. Themagnitude of the errors depends on the decision-making method. It is beneficialthat a control chart detect process change quickly so that the causes of anyundesirable changes can be identified and removed. It is also beneficial thatthe rate of false alarms generated by the control chart be low in order tomaintain the confidence of process operations in the chart.

Sampling cost willbe an issue for most of the applications, thus it is important that a controlchart be able to provide fast detection of process change and a low false alarmrate with a reasonable rate of sampling. So the statistical performance of acontrol chart is often evaluated by considering, for a given false alarm rateand sampling rate, the expected time required by the chart to detect variousprocess changes. It has been found in recent years that the statisticalperformance of control charts can be improved considerably by changing the rateof sampling as a function of the data coming from the process. The basic ideais that whenever there is an indication of a problem with the process thesampling should be more intensive and less intensive when there is noindication of a problem. There are many ways in which the sampling rate can bevaried as a function of process data.

One of the ways is to vary the sampling interval: a short sampling interval is used when there is a indication of a problem and along sampling interval is used when there is no indication of a problem. Theresulting variable Sampling interval (VSI) control charts have been studiedbroadly (see, e. g., Reynolds et al (1988) ; Zee (1990), Runger and Pignatiello(1991); Baxley (1996); and Reynolds (1996a, 1996b).