SAS/QC® 13.1

More Comprehensive Techniques

Overview

SAS/QC software provides a wide range of statistical and graphical tools that help you improve products, optimize processes, and increase levels of customer satisfaction. It enables you to go beyond basic process control by incorporating advanced statistical analyses for a deeper understanding of process variation. SAS/QC 13.1 includes enhancements in multivariate process monitoring, reliability analysis, and other areas.

Multivariate Process Monitoring

The MVPMODEL, MVPMONITOR, and MVPDIAGNOSE procedures, referred to collectively as the MVP procedures, achieved production status in SAS/QC 12.1.

The MVPMODEL procedure provides computational and graphical tools for building a principal component model from multivariate process data in which the measured variables are continuous and correlated. It implements principal component analysis (PCA) techniques that reduce the dimensionality of the data by projecting the process measurements to a low-dimensional subspace that is defined by a small number of components. The principal component model and other output from PROC MVPMODEL serve as input to the MVPMONITOR and MVPDIAGNOSE procedures.

The MVPMONITOR procedure creates control charts for multivariate process data. Multivariate control charts detect unusual variation that would not be uncovered by individually monitoring the process variables with univariate control charts, such as Shewhart charts. In SAS/QC 13.1, PROC MVPMONITOR also creates control charts for principal component scores.

The MVPDIAGNOSE procedure produces principal component score plots and process variable contribution plots that are used to investigate the causes of unusual variation in a process.
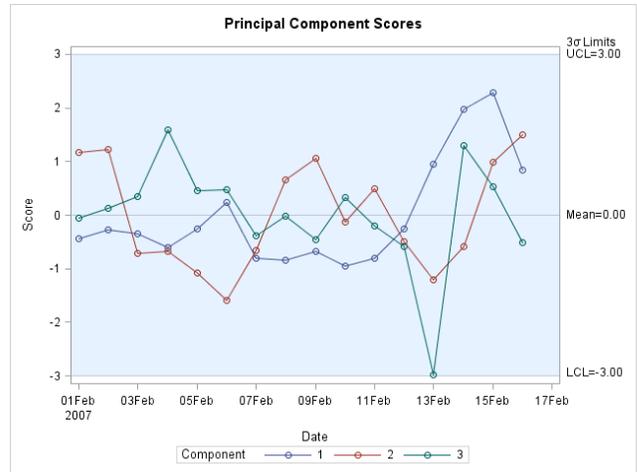

Reliability Analysis

Beginning with SAS/QC 12.1, the RELIABILITY procedure performs a number of inferential tasks that are common to linear models:

- obtaining predicted margins
- estimating contrasts
- displaying the fitted model
- obtaining custom hypothesis tests among least squares means
- performing a partitioned analysis of the least squares means for an interaction
- saving the context and results of an analysis to an item store
- performing *F* tests for model effects that test Type I, Type II, or Type III hypotheses

For recurrent events data, PROC RELIABILITY supports confidence bands for plots of mean cumulative functions (MCFs) and intensity functions, log-rank tests for MCF differences across two samples, tests for trends in MCF models, and Duane plots for diagnosing MCF model fit.

In SAS/QC 13.1, PROC RELIABILITY fits Gompertz distributions to lifetime data and produces recurrent events plots.

Event Plot for Days

Individual Measurements Chart for x
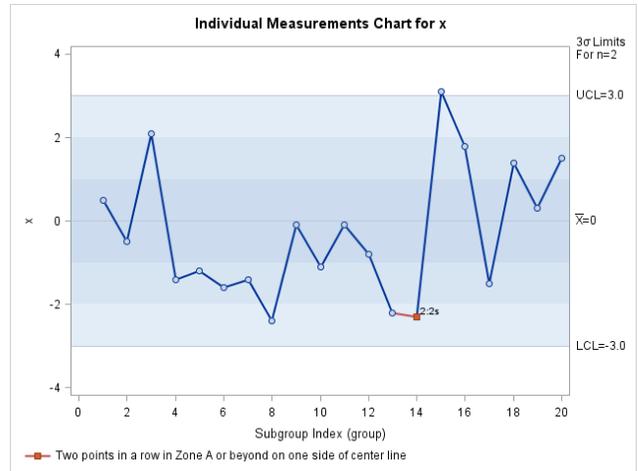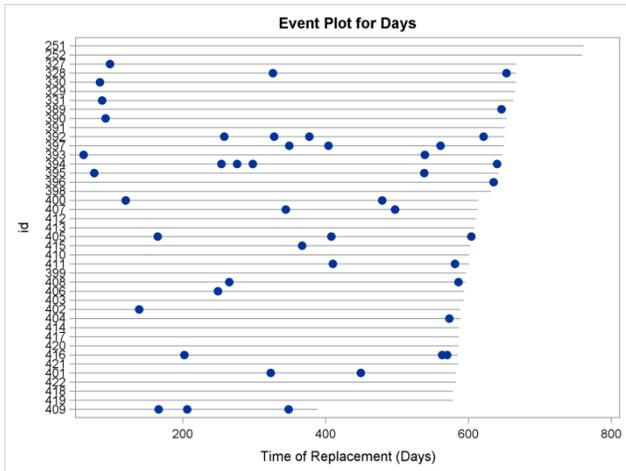
Measurement System Analysis

Effective process monitoring and control depend on accurate and consistent measurements. Four macros are available in SAS/QC 13.1 for evaluating the measurement process (EMP) and measurement system analysis (MSA):

- The %basicemp macro performs a basic EMP analysis.
- The %shortemp macro performs a short EMP study for characterizing relative utility.
- The %msagrr macro performs a traditional gauge repeatability and reproducibility (R&R) analysis.
- The %hongrr macro creates an "honest" gauge R&R report.

## Quality Control for Health Care Laboratories

The SHEWHART procedure supports the Westgard rules for quality control in health care laboratories.

The Westgard rules were developed to monitor the consistency and accuracy of laboratory measurement processes in order to determine whether patient results should be reported.

Other Enhancements

The following are highlights of other enhancements in SAS/QC 13.1:

- The CAPABILITY procedure can overlay histograms for different classification levels in a single graph.

Comparative Analysis of Lot Source
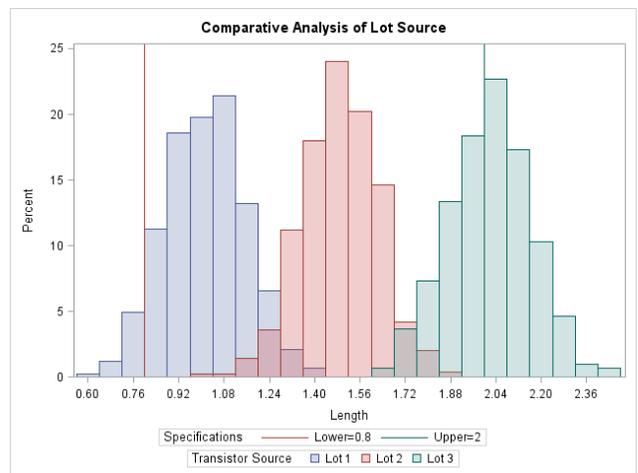
- The SHEWHART procedure provides options for computing improved probability limits for attribute charts.

For More Information

SAS/QC 13.1 is now available; it requires Base SAS 9.4. For complete information about all SAS/QC releases, see the documentation, particularly the What's New chapters, available at support.sas.com/qc/.