The Analytic Examination of Time Dependent Variance Components

Richard Sanders, Mary Leitnaker
University of Tennessee
Doug Sanders
Six Sigma Associates

Key Words: Nested designs; Analytic; Control charts.

Abstract

Dr. Deming states that the application of statistical theory to enumerative problems is generally correct, but the application of traditional techniques to analytic problems may be misleading. An example is the use of traditional Nested Designs to study components of variation. The classical analysis is useful when it is desired to characterize the magnitudes of sources of variation. In contrast, for process studies in which data are collected over time, often the more useful information about the process is to be had by examining the behavior of the variance components over time. Such an analysis allows the investigator to tie the behavior of the process variability to sources of variation affecting the process and to how the effects of this variability may be felt. An alternative method for studying data collected in the same fashion as for a Nested Design uses control charts for an exploratory study of components of variability. The use of this method facilitates process study and the results of the analysis provide direction for improvement.