Chapter 1

What's New in SAS 9 ADX Interface for Design of Experiments

Overview

The SAS ADX Interface for Design of Experiments includes enhancements related to response surface designs, mixture designs, general factorial designs, and split-plot designs. Furthermore, ADX can now import data from SAS data sets or external file formats, and it can export design information to SAS data sets or external file formats.

The SAS 9 ADX Interface now enables you to do the following:

- create general factorial designs with factors having up to nine levels
- construct and analzye two-level full factorial and fractional factorial split-plot designs
- choose a mixed level design from a new expanded design selection
- analyze unstructured experimental data imported from external sources
- analyze fitted models using the new graphical ANOVA
- construct a lambda plot to evalulate the need for a response transformation
- add center points to a design before or after replication
- add replicated points in a new block
- apply a user-specified alpha value for the graphical techniques in fit and optimize
- delete inactive factors and project a fractional-factorial design to a higher-resolution design
- join the means in a box plot
- show clear and aliased effects in the alias structure
- display confidence intervals in the response calculator and experiment report
- honor block structure in a blocked design during design randomization

Details

Response Surface Designs

ADX can now create designs based on Hartley's (1959) small response surface designs.

Variance dispersion graphs are generated in the design details so you can compare designs and choose the best number of center points. This option requires SAS/IML software.

Mixed Level Designs

The number of mixed-level designs offered in ADX has been extensively expanded from the original 213 designs to 25,115 designs. You can now construct designs with up to 9 levels (originally 2 and 3 levels only) and up to 513 runs (originally 108 runs).

Mixture Designs

Process variables can now be included in the creation and analysis of mixture designs. Mixture designs with process variables are created using the optimal design interface. The analysis will determine whether process variables are significant, but all such variables will be included in the optimization process. In the optimization tools, process variables are treated as fixed-level factors.

General Factorial Designs

General factorial designs are designs that run all combinations of factor levels. In ADX, you can create general factorials with factors having any number of levels.

Split-Plot Designs

ADX can now create full factorial and two-level minimum aberration fractional factorial generalized split-plot designs as described in Huang, Chen, and Voelkel (1998).

Observational Data Analysis

Prior to the 9.2 release, ADX could analyze only experimental data from designs that are formally constructed. But ADX customers have reported that there are many situations where they carry out an experiment that is informally designed and want to analyze the data in ADX. ADX can now be used to first import this type of data and then analyze using appropriate statistical and graphical techniques including basic statistical methods such as one-way ANOVA, *t* test, and histogram. This new functionality labeled "Analyze Observational Data" is available from the File menu of the ADX Desktop.

Data Import and Export

ADX can import factor and response values from SAS data sets or external files. You can create the design in ADX and import only the response information, or you can import both the factor levels and the response.

ADX can export design information to SAS data sets and external files for inclusion in a data warehouse. You can export variable information, experiment details, and values for the factors and response.

Access to external file formats requires SAS/ACCESS software.

References

Hartley, H. O. (1959), "Smallest Composite Designs for Quadratic Response Surfaces," *Biometrics*, 15, 611–624.

Huang, P., Chen, D., and Voelkel, J. O. (1998), "Minimum-Aberration Two-Level Split-Plot Designs," *Technometrics*, 40, 314–326.