Qualitysoftware

Simplified Tauchi DOE

Quality Digest

Qualitek-4 **by Tim Knight**

Taguchi's design of experiments methodology is a systematic evaluation of two or more input factors at randomized and varied levels for their contribution to product or process variation. The use of these methods truly leads to process understanding and characterization. Qualitek-4 by NUTEK effectively harnesses the power of Taguchi.

The package's capabilities include the use of L-4 to L-64 arrays. Two to 63 factors may be selected, with two, three and four levels to each factor. Data-analysis options offer the choice of standard or signal-to-noise analysis with choices of bigger, smaller or nominal-is-best categories for quality characteristics. The standard analysis identifies which factors affect the average response, whereas the signal-to-noise analysis consolidates several data points into one value that reflects the amount of variation present.

Getting started on experimental design is easy:

The manual design option presents a spreadsheet-style input screen that allows advanced users the choice of which array to use and the freedom of placing factors into the columns provided. By clicking the Set Interactions button, users can indicate which column represents the interactions of specified factors.

The automatic design option allows Qualitek-4 to select the array used and assign factors to the appropriate columns. This feature is a real timesaver, especially for users less familiar with DOE. The program prompts users to enter the critical design information into a dialog box that offers a number of multiple-level factors to choose from. I tried quite a few combinations of experimental designs and found that the software could suggest an array for each.

Both options can design simple experiments using only an inner array, and experiments that formally incorporate uncontrollable or noise factors into the outer array. In both design modes, Qualitek-4 assists users by suggesting possible interaction columns at the click of a button. Once a design is established, entering experiment trial results is an easy task. Quulitek-4 uses spreadsheet-style input screens here, too.

After entering results, users can analyze the data. This is where the software's true power emerges. The package does an excellent job of presenting results in a logical fashion with very detailed graphics available for selection.

Depending upon how many trials are entered, Quulitek-4 will perform a standard or signal-to-noise analysis. The only difference is that standard analysis utilizes averages or, in the case of a single column of data, a single measurement point, whereas the signal-to-noise analysis is based on the signal-to-noise ratio.

To view the analysis data, users first must select whether the quality characteristic is bigger, smaller or nominal-is-best. The experimental results then show up on the screen, with the option to view a bar graph that compares the average or signal-to-noise ratio for each trial. If there are multiple data entries for each trial, each bar in the graph will have a shaded portion that represents the amount of associated variation present in that trial.

The next screen shows the main effects, with a column that represents the average effects. At this screen, users can view the interaction plots. The resulting tables and graphics are well-

done; they are one of the software's best features. Another nice touch: All interactions may be generated automatically and viewed as graphs.

Next, the ANOVA table offers some good features. *Qualitek-4* enables users to either manually pool the ANOVA results or it does it for them. The last screen, Optimum Conditions and Performance, is the basis for the confirmation experiment. Users can perform a what-if analysis by clicking on the Estimate button. By entering different levels of factors, the software will compute the expected performance levels for that combination.

Context help screens and online help are both done well. However, some additional Taguchi theory entries would be helpful. The user manual gives a good overview of the package's capabilities. Ranjit K. Roy, the software's author, also wrote A Primer on the Taguchi Method, available through the Society of Manufacturing Engineers. One criticism: For the price of the software, a copy of the text would be a nice addition to the supplied material.

Overall, I highly recommend this package. The interface, while simple, offers various experimental design options. The excellent data-analysis capabilities serve to ease the interpretation process. Roy has done an outstanding job of presenting Taguchi methods to all potential practitioners.

About the author
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Qualitek-4 by Nutek, Inc.
System Requirements: 486 or better PC, Windows 3.1, 3.11, or 95, 8 MB free disk space
Price $--------
Contact Nutek at Support@Nutek-us.com
www.Nutek-us.com/wp-q4w.html