

by Lee D. Dawson

DOE Made Easy

I recently attempted to get on one of the 10-speed mountain bikes in my garage. In doing so, I proved the old saying about never really forgetting how to ride a bicycle.

Unfortunately, designed experiments and their proper execution are not like riding a bicycle. Until now, I have found it difficult to retain my facility with design of experiments to be efficient. Because I use it infrequently, I lose a lot of time planning the experiment and analyzing results.

Enter S-Matrix's *CARD*, an interesting and efficient solution to planning, analyzing and reporting designed experiments. (*CARD* stands for Computer Aided Research and Development.) The software neatly walks the user through the complete DOE process, using reasonably clear instructions and Wizards.

The first true test—ease of installation—sometimes can present a problem with technical software, but my teenage daughter successfully installed *CARD*. Then, with tutorials completed, program familiarity established and anticipation growing, I tested it in the field.

Selecting a simple three-factor, two-level experiment on an injection molding process, I launched the navigator Wizard, which asks a few questions to nail down the proper experiment type. The questions are straightforward and easy to respond to, thanks to the on-screen explanations and a definitions help menu. The software provides screens for entering the variable name, units of measure, ranges for the levels and other pertinent details. With the proper experimental design, variables and ranges selected, I launched the design generator to ensure satisfactory design content. Again, the navigator Wizard served as a guide.

CARD analyzes the experiment before execution to ensure that the inputs will achieve desired outputs. People who ignore this step and rush to the experimental runs frequently find they must rerun the experiment because they overlooked a key item.

The program supplies forms for running the experiment and recording the responses throughout the testing organizer. Another convenient feature allows the addition of variables after the experiment has begun, such as an environmental issue, and the day or shift, if they appear to be factors.

Data analysis requires exporting the raw data/information into a customized Excel 5.0 spreadsheet, accomplished reasonably well by the program. You also can import data from other spreadsheet programs such as *QuattroPro* or from competing SPC or DOE packages such as *Minitab* or *Statistica*.

The subsequent automated analysis features provisions to change the data or design if an experimental "run" is compromised or corrupted. This proved convenient for my experiment when an unsuspecting production technician interrupted one run. Because the program uses Excel, I could easily plot results for a pictorial view of the analysis. The *CARD* software also offers graphics options.

Overall, the program worked without glitches, and the output was the best I have seen for DOE. My only question concerned the absence of Plackett-Burman designs

and/or Taguchi-style experiments, used extensively in the automotive industry. S-Matrix explained they deliberately left these out because their designs perform better, provide more information, require fewer runs and have a recoverable design strategy.

CARD makes designed experiments much easier for those of us who employ these techniques infrequently. I won't necessarily run more experiments now that I have a software package that eases the burden of designing efficient experiments, but *CARD* takes some headache out of the process and has earned its space on my hard drive.

About the author

Lee D. Dawson is president of Quality Associates International Inc., headquartered in Dearborn, Michigan. A quality professional with 22 years' experience, he is a metallurgical engineer and an ASQ certified quality engineer. QAI Inc. specializes in reliability/quality, advanced quality product development and risk abatement strategies. For more information, call QAI at (313) 565-6266 or visit their Web site at www.quality-one.com. **qd**

CARD by S-Matrix Corp.

System requirements: *CARD* runs under Windows 3.1 or later, Windows for Workgroups 3.1 or later, Windows 95 or Windows NT. Windows must be operating in enhanced mode. Because *CARD* interacts with Excel, you must have Excel version 5.0 or later, or version 7.0. Excel's Solver Add-In must be installed and activated.

Price: \$795 for stand-alone or network. Discounts available for more than five users.

Educational pricing: \$149 for faculty; includes unlimited consulting. For students: \$79 without manuals, \$99 with manuals.

Contact: S-Matrix Corp.
835 Third St.
Eureka, CA 95501

Circle No. 191



Telephone: (800) 336-8428 or
(707) 441-0404
Fax: (707) 441-0410
Web: www.s-matrix-corp.com