事例研究

Interpretation with Obstacles: A Chemical and a Medical Case Study Revisited

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Well-designed experiments according to the methodology of Genichi Taguchi provide enough reliable data for interpretation. Mostly, the goals are achieved when certain targets are hit, and the main intent seems to be accomplished. Nevertheless, it can be worthwhile to turn back to the original set of data with more experience and the demand for a detailed understanding.

First, a chemical case study is reconsidered. The initial task was to design an appropriate catalyst out of a combination of 27 elements (metals) to reduce the concentration of toxic nitrogen oxides in a fuel-burning process. In 54 experiments the concentration of all chemical compounds was measured and evaluated with the SNR for chemical reactions. Several elements got identified with the highest catalytic performance. Later, the goal was defined much more strictly to avoid -as far as possible- the emission of any toxic component in the exhaust gas. Chemically this translates into reactions in opposite directions, which means to develop a catalyst with contradicting properties. This ambitious task was carried out with the identical set of data.

As a second example, a medical case study is rethought. The area is open-heart surgery. Surveillance data of each individual patient exist during and after the surgery. The challenge is to investigate the earliest possible indication of serious risk for the patient. Thus, appropriate therapy can start immediately to lower the mortality rate even further. The total group consists of 780 patients monitored with 29 parameters. Application of the Mahalanobis-Taguchi algorithm yielded reasonably good discrimination power to separate patients with an inconspicuous clinical picture from patients at risk. The question of the remaining error in both groups could not be answered at that point. For a deeper understanding, the same data set will be analyzed more intensely with medical expertise to further improve the survival rate regarding such severe surgeries.

Key words : system with conflicting properties, multidimensional operating window, subgroups of abnormal group, quality engineering, Taguchi methods, S/N ratio

1 Introduction

The achievements of the Taguchi method are widely recognized. Even with limited data, the

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