

The Optimal Design of Blocked and Split-Plot Experiments

Quality has become an important source of competitive advantage for the modern company. Therefore, quality control has become one of its key activities. Since the control of existing products and processes only allows moderate quality improvements, the optimal design of new products and processes has become extremely important. This is because the flexibility, which characterizes the design stage, allows the quality to be built in products and processes. In this way, substantial quality improvements can be achieved. An indispensable technique in the design stage of a product or a process is the statistically designed experiment for investigating the effect of several factors on a quality characteristic. A number of standard experimental designs like, for instance, the factorial designs and the central composite designs have been proposed. Although these designs possess excellent properties, they can seldom be used in practice. One reason is that using standard designs requires a large number of observations and can therefore be expensive or time-consuming. Moreover, standard experimental designs cannot be used when both quantitative and qualitative factors are to be investigated or when the factor levels are subject to one or more constraints.

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