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**OPTIMIZATION OF ROBUST DESIGN WITH QUANTITATIVE
AND ORDINAL DATA**

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The Taguchi method traditionally focused on one quality characteristic to optimize the control factor settings, yet most products have more than one quality characteristic. Several studies have presented approaches optimizing the multiple quantitative quality characteristics design. Due to the inherent nature of the quality characteristic or the convenience of the measurement technique and cost-effectiveness, the data observed in many experiments are ordinal data. Few published articles have focused primarily on optimizing the multiple quality characteristics involving quantitative and ordinal data. This paper presents a simple approach to optimizing this problem based on the quality loss function. A numerical example of the polysilicon deposition process for minimizing surface defects and achieving the target thickness in a very large-scale integrated circuit can demonstrate the proposed approaches effectiveness.

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