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**Using 6-Sigma Experimental Design Tools in Product Improvement Testing**

The 6-Sigma approach to engineering management includes many useful statistical tools in the “Improvement” phase of the DMAIC (Define – Measure – Analyze – Improve – Control) cycle. One powerful tool – the Design of Experiments (DOE) – provides statistical guidance to the planning of multi-factor experiments.

This presentation will illustrate the use of DOE for product improvement. Product testing is planned and analyzed using a factorial experiment design. Additional model fitting is then performed to confirm the engineering model that was developed to predict the product performance. Statistical tools are used to understand the variation from the predicted values and refine the engineering model.

Two approaches commonly considered in product improvement testing – factorial experiments and engineering models – are reviewed. Advantages to each, and the synergy of using them together, are illustrated. Recent work performed by the authors at Mueller Industries illustrates the practical industrial value of such an experimental approach.

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