



APPLYING THE TAGUCHI METHOD TO ENHANCE SOIL AND STAIN REMOVAL

Young-Ah Kwon

Silla University, Pusan, Korea

Sara J. Kadolph,

Iowa State University, Ames, IA 50011

Sherry Schofield-Tomschin

VPI & SU, Blacksburg, VA 24061

Mandated energy savings and changes in detergent formulation and consumer laundry practices push the washing machine industry to understand more completely how various factors affect soil and stain removal. We examined the laundry process from a holistic perspective by integrating important factors. The Taguchi experimental design method weighs all factors equally in assessing the impact of accelerated laundry variables on soil/stain removal. Dependent variable was stain/soil removal; independent variables were stain/soil type, fabric, wash time and temperature, detergent, and agitation. We used AATCC 151 Soil Redeposition: Launder-Ometer Method and evaluated results by calculating the change in specimens' Y-values.

Stain removal was affected by fabric, stain, detergent, temperature, agitation, wash time, water hardness, and water volume. Wash temperature was the most significant variable. The Taguchi experimental design method is effective in identifying significant factors for multi-dimensional laundry studies. Water volume is another significant factor in removal.

Implications and recommendations for consumers and manufacturers are many. Combinations of a brief wash time at high temperature and a longer wash time at warm temperature would save energy and maximize stain removal. Cold water does not remove stains, even with more detergent. Future research should examine wrinkling, shrinkage, and color retention in accelerated conditions. Full scale studies using current vertical and horizontal consumer washers are needed to assess significant laundry variables.