

# **Optimization of Extrusion Process Parameters using Taguchi integrated GRA**

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## **Abstract**

The pillars of quality engineering are known to be system design, parameter design and tolerance design. The primary aim of design of experiment based parameter design is to have a robust product capable of consistently functioning withstanding the entire nuisance factor at one hand and reducing performance variation of a product on the other. In this particular study an immense endeavors are made to reduce the variability in response characteristics such as thickness of a PVC pipe and it's respective outside diameter. A Taguchi based grey relation algorithm is used to design the optimum parameters of the process. Extrusion process parameters such as vacuum pressure, die temperature zone one through four, extruder rpm, feeder rpm and hall off speed are considered. An orthogonal array of mixed L18 is used for the experiment. Optimal extrusion process parameters are determined by the grey relational grade obtained from the grey relational analysis for multi-performance characteristics; thickness and outside diameter; which enable to have these response values closer to their target values. The study indicated that die zone temperature one as the most significant factor influencing thickness and outside diameter of the product (110mm and 3.2mm). The analysis of variance, ANOVA conducted also shows the same verity with the experiment results. The implementation of gray relation analysis for optimization of multiple quality characteristics have a paramount importance to minimize deviation experienced by a product quality characteristics.

## **Keywords**

Extrusion process parameter optimization; gray based optimization; quality engineering techniques