

## Optimization of Two Quality Characteristics in Injection Molding Processes via Taguchi Methodology

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**Abstract :** The main objective of this research is to optimize tensile strength and dimensional accuracy in injection molding processes using Taguchi Parameter Design. An L16 orthogonal array (OA) is used in Taguchi experimental design with five control factors at four levels each and with non-controllable factor vibration. A total of 32 experiments were designed to obtain the optimal parameter setting for the process. The optimal parameters identified for the shrinkage are shot volume, 1.7 cubic inch (A4); mold temperature, 130 °F (B1); hold pressure, 3200 Psi (C4); injection speed, 0.61 inch<sup>3</sup>/sec (D2); and hold time of 14 seconds (E2). The optimal parameters identified for the tensile strength are shot volume, 1.7 cubic inch (A4); mold temperature, 160 °F (B4); hold pressure, 3100 Psi (C3); injection speed, 0.69 inch<sup>3</sup>/sec (D4); and hold time of 14 seconds (E2). The Taguchi-based optimization framework was systematically and successfully implemented to obtain an adjusted optimal setting in this research. The mean shrinkage of the confirmation runs is 0.0031%, and the tensile strength value was found to be 3148.1 psi. Both outcomes are far better results from the baseline, and defects have been further reduced in injection molding processes.

**Keywords :** injection molding processes, taguchi parameter design, tensile strength, high-density polyethylene(HDPE)

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