

A Novel Optimization Approach Applied in Injection Molding of a Led Lighting Module

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Abstract

This study presents a novel optimization approach for injection molding with multiple performance characteristics through data mining and analysis to effectively determine the optimal process parameter settings. The quality characteristics of the LED lighting modulus can be categorized into the beam angle and the luminous intensity. The control factors for the process are mold temperature, melt temperature, injection velocity, packing pressure and VP switch. The Taguchi method is employed to conduct signal-to-noise (S/N) ratio optimization. Taguchi orthogonal array experiments are performed, and then the experimental data are trained and tested by back-propagation neural networks to create a S/N ratio predictor. In addition, the S/N ratio predictor is combined with genetic algorithms (GA) to obtain the process parameter combination on maximum S/N ratio for both beam angle and luminous intensity. As a result, the proposed novel optimization approach can create the better process parameter settings which can not only be more robust and meet the dimension specification, but also enhance the stability of injection process.

Keyword : LED lighting modulus, injection molding, Taguchi orthogonal array, BPNN, GA.