Process parameter optimization for MIMO plastic injection molding via soft computing

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Abstract

Determining optimal process parameter settings critically influences productivity, quality, and cost of production in the plastic injection molding (PIM) industry. Previously, production engineers used either trial-and-error method or Taguchi’s parameter design method to determine optimal process parameter settings for PIM. However, these methods are unsuitable in present PIM because the increasing complexity of product design and the requirement of multi-response quality characteristics. This research presents an approach in a soft computing paradigm for the process parameter optimization of multiple-input multiple-output (MIMO) plastic injection molding process. The proposed approach integrates Taguchi’s parameter design method, back-propagation neural networks, genetic algorithms and engineering optimization concepts to optimize the process parameters. The research results indicate that the proposed approach can effectively help engineers determine optimal process parameter settings and achieve competitive advantages of product quality and costs.

Keyword：Plastic injection molding; Back-propagation neural networks; Taguchi’s parameter design; Genetic algorithms; Soft computing