

Multi Response Optimisation of Injection Moulding Process Parameter Using Taguchi and Desirability Function

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ABSTRACT

In this study, the optimum injection molding process parameter of warehouse plastic pallets is identified. Compressive strength and part weight are the selected quality characteristic. Barrel temperature, injection speed and holding pressure are the selected process parameter. Taguchi optimization method and desirability function is used to identify the most effective process parameter on the compressive strength and part weight. Based on the conducted experiment, 241 °C of barrel temperature, 72 mm/s of injection speed and 11 MPa of holding pressure, optimise the compressive strength to 5242 kg and part weight to 11.6 kg. The optimised process parameters are studied with an actual experiment and the percentage error of optimised process parameter are identified which is 4.6% for compressive strength and 0.2% for part weight. Moreover, a quantitative relationship between the process parameter and the selected quality response is established using regression analysis. The percentage error of the prediction model for compressive strength is 10% and for part weight is 0.3%. Thus, the prediction model used in this study is effective and practical. This research is beneficial for all the plastic moulding industry which produce plastic pallets. The results can save cost on material consumption and also ensure high product quality.

KEYWORDS: Injection moulding; Optimisation; Taguchi; Desirability function; Regression analysis

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