Determining optimal moulding process parameters by two level factorial design with center points

Abstract

Determining optimal process parameter setting critically influences productivity, quality and cost of production in the injection moulding industry. Previously production engineers used trial and error method to determine optimal process parameter setting. Inappropriate machine parameter settings can cause production and quality problems. In this paper the authors used a case study to investigate the moulding machine parameters which will affect the dimensions (length and width) in a plastic component. The machine process setting in use currently caused variations in the dimensions exceeding the specification limit. Therefore the experiment is needed to identify the optimal machine parameter setting which could be set to maintain the dimensions closest to the target value with smallest possible variation. A design of experiments (two level factorial design with centerpoints) was conducted to study the effect of three injection moulding process parameters (mould temperature, injection speed and injection pressure) versus dimensions (length and width). Finally, the optimal process parameters to maintain the dimensions closest to the target values were identified. Statistical results and analysis are used to provide better interpretation of the experiment. The models are form from ANOVA and the models passed the tests for normality and independence assumptions.