

Analysis of optimal injection moulding process parameters for thin-shell plastic product using response surface methodology

Abstract

The injection molding process is used to produce thin-walled plastic products for a wide variety of applications. However, the difficulty in adjusting optimum process parameters setting may cause defects on injected moulded parts such as shrinkage. A study was conducted for the determination of the optimal injection moulding process parameters which will minimize the shrinkage defect on a thin-shell plastic product for cell phone housing component. The machine process setting in use currently caused shrinkage where variations in the dimensions of the length and width below the specification limit. Therefore the experiment is needed to identify the optimal process parameters that could be set to maintain the length and width dimensions closest to the target value with smallest possible variation. The process parameters selected in this study are the mould temperature, injection pressure and screw rotation speed. The Response Surface Method (RSM) of analysis was used for the determination of the optimal moulding process parameters. The significant factors affecting the responses were identified from ANOVA. Statistical results and analysis are used to provide better interpretation of the experiment. Verification runs with the optimal process parameter setting found by RSM determined that the shrinkage defect can be minimized.