Minimization on warpage defect in injection molding part of ABS (Acrylonitrile Butadiene Styrene) material by using design of experiment (DOE)

Abstract

Every plastic part that undergoes the plastic injection molding process will have the behaviour of warpage when it has cooled after injection process. It needs a proper way of controlling the rate of warpage, so it is between the accepted ranges. This paper research about a minimization on warpage defect in injection molding part of ABS (Acrylonitrile Butadiene Styrene) material by using Design of Experiment (DOE). The part chosen is from company which had a critical issue of warpage on one of the part produced. The approach of Taguchi method is applied for the optimization of process parameters selected which is the mold temperature, melt temperature, packing pressure, packing time, and cooling time. For this purpose, Moldflow Plastic Insight (MPI) software is used for the simulation of injection molding process. The number of simulation is based on the three level of L27 Taguchi Orthogonal Array (OA). The Minitab software is used to analyzed the result where the the S/N (signal-to-noise) ratio and analysis of variance (ANOVA) is utilized to see the most significant factors contribute to warpage. The confirmation test shows the best combination of process parameters using the Taguchi approach to minimize the warpage on the part.