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Comparison between single and multi gates for minimization of warpage using taguchi method in injection molding process for ABS material

Abstract

In this study, a mold is designed in single and dual type of gate in order to investigate the deflection of warpage for thick component in injection molding process. Autodesk Moldflow Insight software was used as a medium for experimental tested. Nessei NEX 1000 injection molding machine and P20 mold material details were entered in this study to get more accurate data on top of Acrylonitrile Butadiene Styrene (ABS) as a molded thermoplastic material. Taguchi orthogonal array, analysis of Signal to Noise (S/N) ratio and Analysis of Variance (ANOVA) were implemented to get the best combination of parameter and significant factor that affect the warpage problem for both types of gates. Coolant inlet temperature, melt temperature, packing pressure and packing time are the selected parameter that used in this study. A conformation test is conducted to verify the combination parameters optimized. From the result, multi gates used was founded that can decrease the deflection of warpage for thick product. From ANOVA, the most significant factor is melt temperature for single gate, and coolant inlet temperature for multi gate. Packing pressure and packing time were slightly influence on warpage problem for both studies.

Keywords; Analysis of Variance (ANOVA), Injection Molding, Multi Gates, Taguchi, Warpage