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Warpage Optimisation on the Moulded Part using Response Surface Methodology (RSM) and Glowworm Swarm Optimisation (GSO)

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Abstract. Nowadays, there are various of optimisation methods that have been explored by many researchers to find the appropriate processing parameters setting for the injection moulding process. From the previous researches, it was reported that the optimisation work has improved the moulded part quality. In this study, the application of optimisation work to improve warpage of the front panel housing have been explored. By selecting cooling time, coolant temperature, packing pressure and melt temperature as the variable parameters, design of experiment (DOE) have been constructed by using the rotatable central composite design (CCD) approach. Response Surface Methodology (RSM) was performed to obtain the mathematical model. This mathematical model then will be used in Glowworm Swarm Optimisation (GSO) method in order to determine the optimal processing parameters setting which will optimise the warpage condition. Based on the results, melt temperature is the most significant factor contribute to the warpage condition and warpage have optimised by 39.1% after optimisation. The finding shows that the application of optimisation work offers the best quality of moulded part produced.

1 Introduction

Injection moulding process consists into four main stages which are filling, packing, cooling and ejecting processes [1, 2]. Due to the complexity of injection moulding process, it is difficult for injection moulding industries in order to produce the best quality of the moulded part. Most common defects in injection moulding is a warpage [3]. Warpage is difficult to prevent due to design complexity and numerous influencing factors which affected the assembly process because of uneven clearance or interference problems. With an appropriate

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