Thiwakorn Aphirakthanakorn 2012: Optimization of Number and Locations of Gates for Rubber Injection Mold by using Genetic Algorithms. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Miss Anchana Wongsto, Ph.D. 136 pages.

In this work, the Artificial Neural Network (ANN) was developed and employed with Multi-Objective Genetic Algorithm (MOGA) in order to optimize the number and locations of gates in rubber injection mold. The predicted results obtained from Computer Aided Engineering (CAE) program i.e. CADMOLD were utilized to construct the multi-functional objectives. The 2, 2.5, and 3D models was simulated and compared with those obtained from experiments regarding the flow pattern and weld line location. The flow pattern analysis obtained from thin-wall moldings indicated that the 2.5D model was in agreement with the experimental result. For the case study 1, the front case of notebook computer, the number of gates used was 4 and the injection pressure and its standard deviations (SD) were specified as multi-functional objectives. The analytical results showed that the ANN incorporated with MOGA can be used for the prediction of gate and air vent locations with the accuracy of 97.12%. For the case study 2, the injection pressure and weld line location were employed as multi-functional objectives and the number of gate used was reduced to 1 gate. The accuracy for the developed model was 99.39%. For the case study 3, the model was developed by using the bi-section method in order to reduce the time consuming during the optimization for weld line location and that can also increased the number of gate used when the maximum injection pressure was reached. It was found that the developed model can predicted the occurred injection pressure and weld line position with the accuracy of 86.39%. In addition, it can also be seen that the predicted results obtained in the case study 2 were in good agreement with those from existing experimental results. Therefore, it can be concluded that the developed model can be employed as a valuable tool for the optimization of the number and location of gates.

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