Vapor chamber utilization for rapid cooling in the conventional plastic injection molding process

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Abstrak

Injection molding is the most common process for producing plastic products. The surface quality and the cycle time of the plastic product is strongly influenced by the cooling system, which accounts for approximately 70% of cycle time. In conventional injection molds, beryllium copper (BeCu) inserts are commonly used to speed up the cooling process and to obtain a uniform temperature distribution. This study aims to compare the abilities of the vapor chamber and the BeCu insert to increase the cooling rate and provide an even temperature distribution. The experiment was conducted with variations in heat inputs, cooling temperatures, and cooling rates. The vapor chamber had a copper foam wick with a pore diameter of 0.2 mm, filling ratio of 30%, and water as the working fluid. The vapor chamber provides an effective way to speed up the heat transfer process in injection molding, with heat transfer up to 67% greater than in conventional cooling methods that use BeCu.