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Numerical and Experimental Validation of Breakthrough Phenomena in Sandwich Injection Molding Process

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In sandwich injection molding, two polymeric materials are sequentially injected into a mold to form a multi-layer product with a skin and core structure. Different properties of these polymers and their distribution in the cavity greatly affect the applications of the moldings. For the skin layer, special polymers can be used to provide good appearance, strength, chemical resistance, EMI shielding and other functions, whereas the core material can be selected from recycled or inexpensive materials. In combination it can improve part quality and lower the cost. In an ideal situation, the core material should be entirely encapsulated by the skin material. When the flow front of the core material overtakes that of the skin material, breakthrough occurs resulting in a defective part. The commercial simulation package (Moldflow) has been extensively verified against experiments performed with a simple mold geometry as well as with a more complicated part. Since numerical results are in good agreement with the experimental ones, so it can be suggested that the simulation program can be used as a valuable tool for the prediction of melt flow behavior during sandwich injection process.