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Water / Gas Assisted Injection moulding: Comparison of filling simulation results with the instrumented process.

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An industrial injection moulding machine is fitted with both water and gas assist modules. The processes are computer monitored to obtain data regarding the actual process status during moulding. In addition, a transducer fitted in-mould provides combined pressure and temperature data during the entire moulding cycle. Data on the process dynamics are presented to link the formation of the residual wall to process parameters such as melt temperature, mould temperature, melt injection rate, water / gas injection pressure and water / gas injection delay time.

The dynamics of the processes are captured in a three-dimensional finite element flow analysis code. Non-Newtonian, non-isothermal flow solutions are obtained by solving the momentum, continuity and energy equations. An additional transport equation is solved for tracking polymer/fluid interface. The modeling investigates the relationship between the residual wall formation and boundary conditions that relate to real process parameter settings. Comparisons between the actual moulding process responses during the cycle, such as temperature and pressure, can be made with the modeling results.