

Polymorphic Crystallization of β -Nucleated Polypropylene in Pipe Extrusion – Comparison between Simulation and Experiment

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In order to meet the increasing requirements in new market segments as well as to overcome the growing competition of other materials the polymorphism of PP can be used. Special nucleating agents are added to induce the β -modification which leads to an improved longterm strength and elevated impact resistance of the final product.

The present work aims at verifying the assumed influence of processing/cooling conditions on the morphology by simulating the cooling behavior of an extruded pipe with a common FE-program (Abaqus/CAE 6.5) and evaluating the resulting fraction of β -modification.

Many existing theoretical approaches describing the crystallization behavior require an expensive and time-consuming material characterization. To offer the operator an inexpensive estimation of the crystallization behavior, the used model bases on a single (CCT) test. First comparisons of the simulated values with WAXD-measurements on produced pipes show a qualitatively good agreement. The discussed model is able to display the different behavior at the inner and outer layer of the pipes.