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Film Casting of Polymers with Crystallization along the Draw Line. The Effects of Quenching Air

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In the film casting process, the polymer melt is extruded through a slit die and the film is drawn in air by chill rolls. The melt can solidify during the path in air, if the temperature decreases enough.
In this work polymer film casting experiments have been performed using a commercial iPP, under operating conditions such as the solidification takes place during the path in air. The experiments have been carried out with and without the presence of two jets of cooling air, impinging the film from the two sides. The effects of the presence of quenching air on film width, axial velocity and temperature experimental profiles were reported and briefly discussed.
High cooling rates available by effect of quenching air jets allowed us to perform tests in which high level of deformation rate were achieved. The observed crystallization temperatures during film casting tests were increased with respect to quiescent crystallization tests performed under similar cooling rates. The morphology of final products was analyzed by several optical techniques, and the results are discussed.