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Flow Distribution in Flat Spiral Mandrel Dies

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Spiral mandrel dies are widely employed in the processing of polymeric films in the blown extrusion process. Although, in recent years the use of stackable (flat) spiral dies in blown film extrusion is being developed, a phenomenological study on designing parameters of this type of die has not received much attention. In the present work, a power law fluid flow analysis was performed on a typical flat spiral die by using an approach similar to that presented by Rauwendaal. The effects of some design parameters, such as the number of grooves, the initial flight clearance and the initial groove depth on the pressure gradient and flow distribution were also investigated. It has been found that the uniformity of flow distribution improved with increasing number of grooves, initial groove depth and coefficient of Archimedes type flat spiral. Moreover, results showed that there is an optimum value for the taper angle of clearance between two plates of die and initial clearance 0.05mm, in which the flow distribution is the most uniform.