SL 15.13

Numerical Modeling of Contraction of Extruded Filamentary Foams

Z. Zhu, C.B. Park, D. Xu and R.G. Fenton
Department of Mechanical & Industrial Engineering, University of Toronto
Toronto, Ontario, Canada M5S 3G8

In this study, a non-isothermal cylindrical layer-to-layer diffusion model was developed to describe the contraction of extruded foam that occurs at the exit of a filamentary die. The model was constructed to assess foams composed of a great number of circular cells which are arranged concentrically. Transport of the blowing agent within the foam, as well as gas loss from the foam skin into the ambient atmosphere, was determined by converting foams into concentrically layered foams. Gas pressure and temperature were governed by the mechanical balance equation and the heat transfer equation, respectively. As a result, gas loss, foam dimension, and volume expansion ratio were qualitatively estimated as the extrudate proceeded. The effects of the processing temperature on foam contraction were examined. In general, efforts were made to improve a fundamental understanding of foam contraction followed by expansion at the exit of a filamentary extrusion die.