Ravivat Rugsaj 2014: Parison Thickness Analysis for Extrusion Blow Molding. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Satjarthip Thusneyapan, M.S. 123 pages.

Extrusion blow molding is a process used to produce hollow workpieces or liquid containers. The parison is blown against the wall of the mold, and set to the required shape as it is cooled. The control of the parison thickness distributed along the body of the container is critical in obtaining the desired strength of the product. In this research, the finite element model (FEM) of the extrusion blow molding process is developed for predicting the wall thickness of containers. The sampled bottles were made from HDPE (High Density Polyethylene). The mathematical model of the hyperelastic and viscoelastic materials are used to describe the behavior of the parison at high temperature. The simulation is then performed by applied process conditions, they are initial parison thickness, temperature and blowing pressure. The finite element analysis (FEA) results show that the viscoelastic model is a good approximation to predict the final wall thickness for both axisymmetric and non-symmetric bottle shapes. The predicted wall thickness from the viscoelastic model is in good comparable with the actual bottle with the average error of 33.17%. While, the hyperelastic model yield better accuracy with the average error 29.15%. However, the hyperelastic model was found not suitable for non-symmetrical shape due to the complexity in setting of the numerical conditions which frequently caused the divergence of the calculation. The accuracy of the viscoelastic model can be improved by obtaining the material parameters by further tensile testing. The application for prediction the blowing time and the variation of the parison thickness were shown possible by using the presented method.

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