

Development of Finite Element Analysis Model for predicting Bulk Bag Behavior

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벌크백 변형 예측을 위한 유한요소 해석모델 개발

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Abstract

A domestic research team has developed a bulk bag used to transport/storage/dispose of very low level waste(VLLW) in radioactive wastes generated during nuclear decommissioning. Bulk bags must not leak radiation at any stage, including packaging, transportation, and storage. In addition, bulk bags can be exposed to a variety of conditions depending on the type of waste and treatment method. In order to satisfy durability, the bulk bag has a multi-material, multi-layer structure. Therefore, since design and behavior prediction is very difficult, the bulk bag relies on testing after manufacture to determine whether it can be used or not. Evaluation by test is the most rational method. However, since the bulk bag can be deformed in a wide variety of ways, the results of one test may be insufficiently representative. In addition, it is very disadvantageous in terms of cost in order to test under various conditions that meet the regulations. In order to compensate for these shortcomings and to understand the exact behavior of bulk bags under various conditions, an approach method different from the existing one is required. Finite element analysis (FEA, Finite Element Analysis) of the engineering approach is possible to accurately predict the safety of the structure through quantitative results such as various energy, displacement, stress and strain. In this study, a structural analysis model was developed to analyze the behavior of bulk bag. Through the development of a structural analysis model, it was possible to predict the durability performance of the bulk bag and accurately simulate the effect of the contents deformation and movement. In the end, the validity of the analysis model was presented by comparing the structural analysis results of this analysis model with the existing test results.