Abstract

The Use of Impact Analysis in the Development of the ES-2100 Shipping Package

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Y-12 Nuclear Packaging Program (NPP) has developed the ES-2100 Shipping Container over the past several years. The ES-2100 is a drum type Type B fissile material shipping package that is unique in that it is fully fireproof. Kaolite 1600®, a thermal ceramic made mostly of Portland cement and expanded vermiculite, was chosen as the impact-absorbing and thermal-insulating material for this new package concept. Initially, impact analysis was used to determine if the Kaolite 1600® was likely to function properly during Hypothetical Accident Impact (i.e., 30 ft drop test). The results of this early finite element analysis were encouraging enough for NPP to proceed with the acquisition of prototype units, which were subsequently tested to 10 CFR 71.73 conditions. The results of testing led to an effort to better characterize the structural properties which were subsequently used for additional impact analysis. The newly refined model was used to help improve the design of the ES-2100, including a change in the drum-lid closure system. The ES-2100 received certification from DOE for shipment of Highly Enriched Uranium Metal in June of 2000. Y-12 NPP has been informed by the U.S. Patent Office that a patent will be issued for the unique design of this shipping package. This presentation will go into greater detail surrounding the ES-2100 Shipping Package and the use of impact analysis in its design.

Presenter's Biography

Matt Feldman works for the Y-12 Nuclear Packaging Program, where he is responsible for package certification as well as new package development. Matt has a B.S. Degree in Chemical Engineering from the University of Tennessee as well as an M.S. Degree in Chemical Engineering from the University of Illinois. Matt has been involved with Type B Packaging for the past 13 years in the Oak Ridge area, initially as a thermal analyst and more recently in his current role with the Y-12 Nuclear Packaging Program.