



Activities of the ASME

Task Group on Computational Modeling For Explicit Dynamics



- In my presentation on Monday on Strain-based Acceptance Criteria, I mentioned that we have a Problem.

Problem

- Structural Mechanics finite element codes for explicit dynamics are now sufficiently sophisticated and robust that complex impact events can be simulated with reasonable accuracy.
- Unfortunately, the ability of users to properly implement the features that make these codes so sophisticated and robust has become a noticeable problem.

Why do we have this Problem?

- Too easy for engineers to construct a finite element (FE) model that “looks” like the actual structure, and they unaware of the limitations of their knowledge.
- Engineers well versed in static analysis and implicit dynamics FE methods are totally unaware of the challenges presented by explicit dynamics FE codes.
- Managers in many organizations have no appreciation for the level of training and knowledge, and years of experience it takes to properly use an explicit dynamics code.
- Let me give you two examples.



ASME Task Group Founded

- The ASME Task Group on Computational Modeling for Explicit Dynamics was founded in August 2008 for the purpose of creating a quantitative guidance document for the development of finite element models to analyze energy-limited events using explicit dynamics software.

- **So What?**
- **What makes this different?**



Linkage Directly to the ASME Code

- The ASME Code Strain-Based acceptance criteria shall be applicable only to “Quality Models.”
- A Quality Model is a model that adheres to the guidance set forth in the ASME Computational Modeling Guidance Document for Explicit Dynamics Software, or has been developed with the use of convergence and sensitivity studies. This will become an Appendix in the ASME Code and be referenced in NRC Reg. Guide 7.6

How do we start?

- Assemble a group of internationally recognized experts in explicit dynamics, and engineers with broad practical experience in the testing and manufacture of cask systems.



Members of the ASME Task Group on Computational Modeling for Explicit Dynamics

- Doug Ammerman Sandia National Laboratory (Secretary)
 - Gordon Bjorkman Nuclear Regulatory Commission (Chairman)
 - Ginny Broz Bettis Laboratory
 - Jeff Jordon Savannah River National Laboratory
 - David Molitoris Westinghouse
 - Peter Shih Transnuclear (Areva)
 - Spencer Snow Idaho National Laboratory (Strain-Based Criteria)
 - Chi-Fung Tso ARUP, United Kingdom (Author TCSC-1087)
 - Frank Wille BAM, Germany
 - Michael Yaksh NAC International
 - Uwe Zencker BAM, Germany
-
- Significant Public Participation at Meetings

Start Simple and Build

- Of all the considerations that go into constructing an accurate finite element model, the choice of element type and the level of refinement of the element mesh are the most fundamental.
- Therefore, begin with a series of element convergence studies to establish minimum requirements for an element mesh necessary to achieve accurate results.
- Today we will provide preliminary results from two of these studies:
 - Propped cantilever beam subjected to a uniform impulsive load.
 - Flat plate impacting a puncture bar.

Current Task Group Activities

- **Propped Cantilever Convergence Study**
 - Hex Elements
 - Reduced Integration
 - Thin Shell Elements
- **Flat Plate Puncture Drop**

