

## Overview of ASME PTC-60 End-to-End Verification and Validation Example

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### ABSTRACT

The American Society of Mechanical Engineers (ASME) Standards Committee on Verification and Validation in Computational Solid Mechanics (PTC-60) approved their first document (*Guide*) in July 2006. The *Guide* has been approved by ASME and the American National Standards Institute (ANSI) for public release. The *Guide* is available through ASME publications as V&V 10-2006:

*Guide for Verification and Validation in Computational Solid Mechanics*  
[http://catalog.asme.org/Codes/PrintBook/VV\\_10\\_2006\\_Guide\\_Verification.cfm](http://catalog.asme.org/Codes/PrintBook/VV_10_2006_Guide_Verification.cfm)

In early 2007 the Committee launched its next major project, a comprehensive End-to-End Example that will be used to illustrate the most important aspects of verification and validation (V&V) described in the *Guide*.

Elements of V&V included in the example [*Guide* Section references in brackets]

- Conceptual model including intended use [Section 3.1]
- Mathematical model [Section 3.2]
- Computational model [Sect 3.3]
- Code verification – convergence using analytical solution [Section 4.1]
- Calculation verification – model convergence [Section 4.2]
- Model parameter calibration [Section 3.4.1]
- Validation experiments [Section 5.1, 5.2]
- Comparison of model outputs to experimental measurements [Section 5.3]
- Uncertainty quantification and propagation [Section 3.6]
- Decision of model adequacy [Section 5.3.2]

The objective of the selected simple example is to accurately simulate the static behavior of aircraft wing under distributed load. This provides the *Reality of Interest*

that begins the modeling process and subsequent steps in the model verification and validation.

This presentation provides an update on this work-in-progress and hopes to solicit comments from the computational mechanics community to guide the development of the End-to-End Example.

Members of the PTC-60 Task Group developing the End-to-End Example:

- Tom Paez, Sandia National Laboratories (*Task Group Lead*)
- Hans Mair, Institute for Defense Analyses
- Bill Oberkampf, Sandia National Laboratories
- Len Schwer, Schwer Engineering & Consulting Services
- Don Simons, Northrop Grumman
- Ben Thacker, Southwest Research Institute