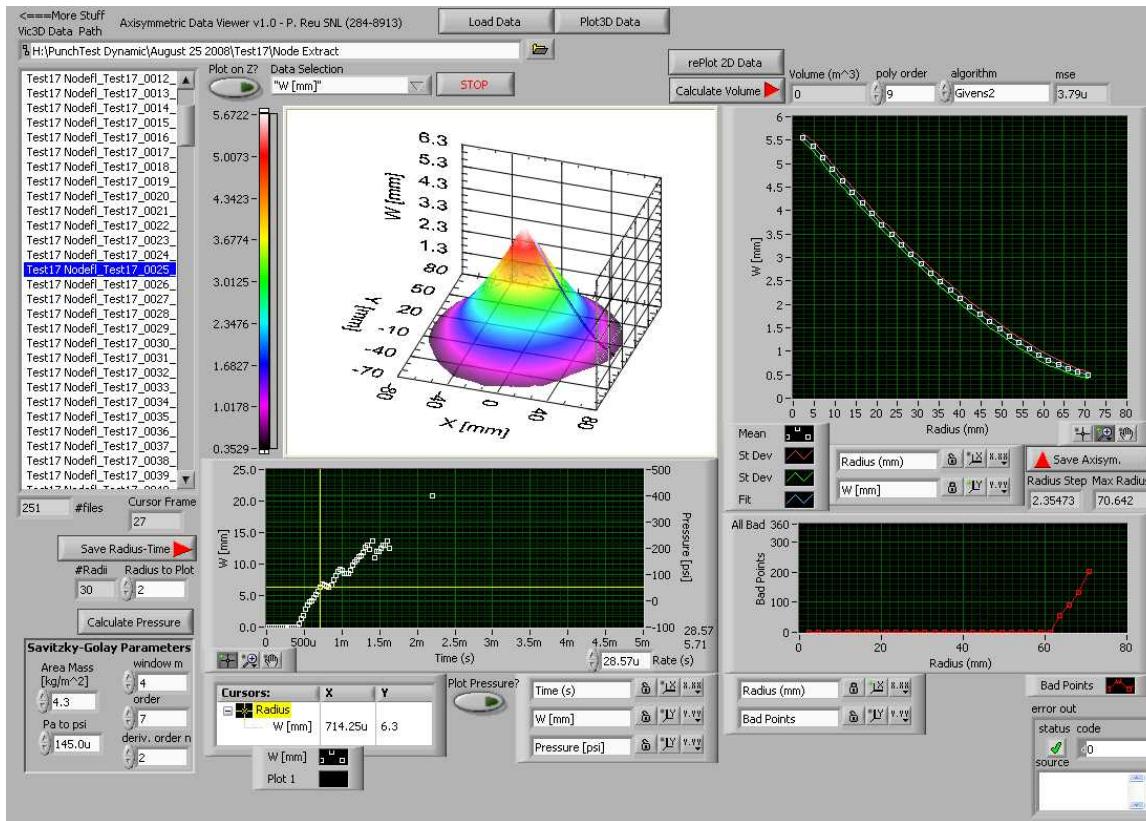


Measurement of steel plate perforation tests with digital image correlation

SAND2009-3291C



SEM Annual Conference June 1-3, 2009

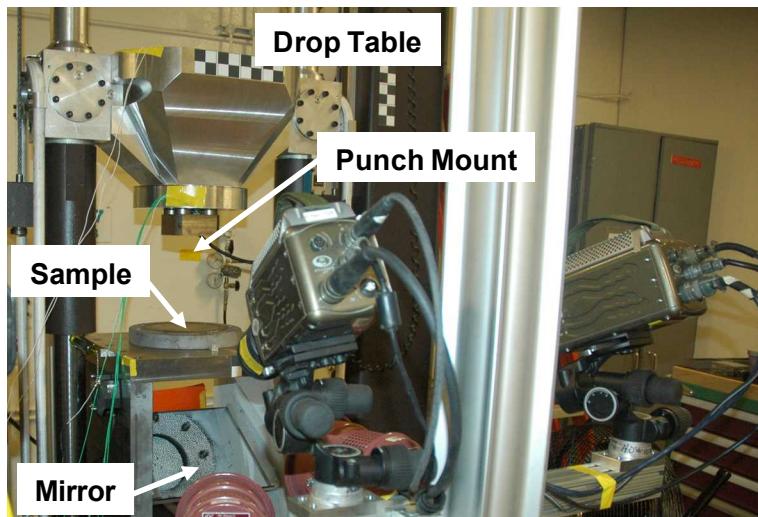
Phillip L. Reu, Doug J. VanGoethem, and Theresa E. Córdova



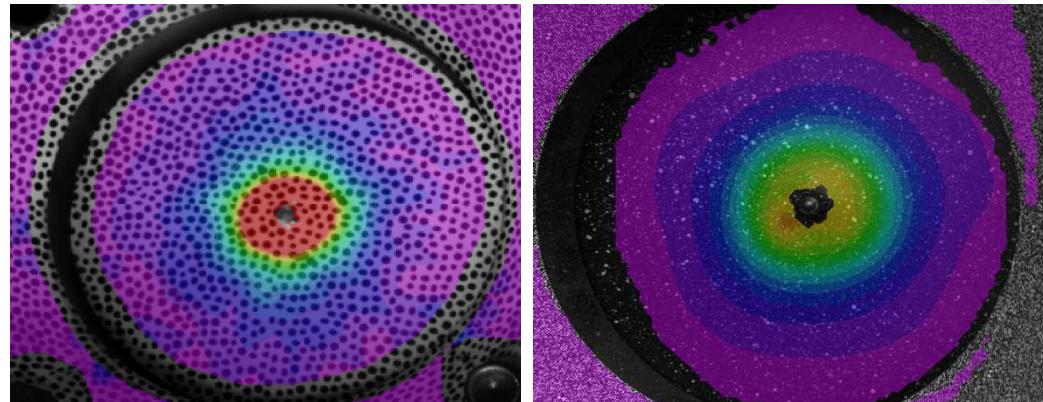
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.



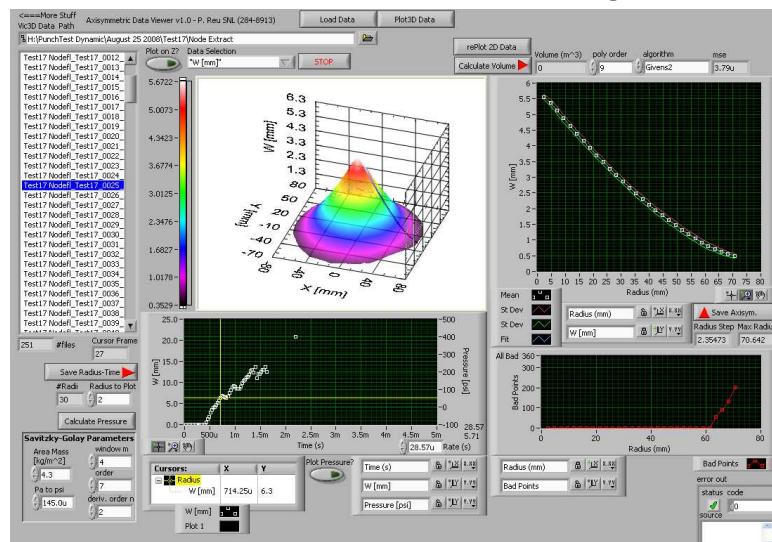
Full-field results for axisymmetric model validation



Experimental Setup



Dynamic versus Quasistatic

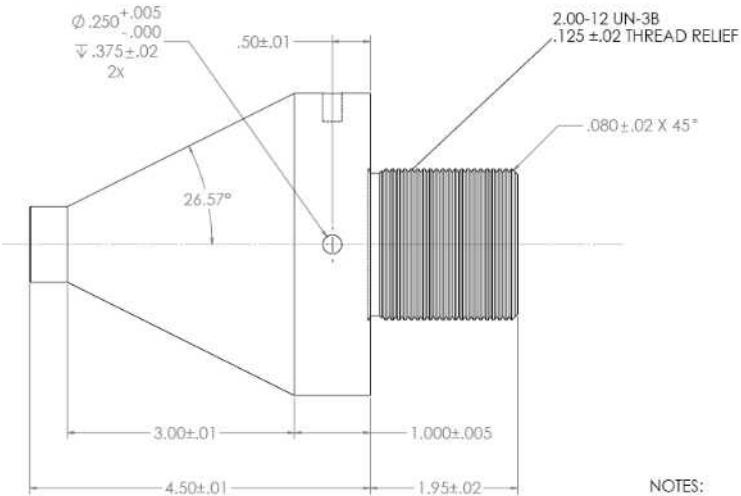


Axisymmetric data reduction



Sandia
National
Laboratories

Two different materials and two different punch types were tested



Cylindrical Punch

Conical Punch

Materials Tested:

- Abrasion resistant plate
- Mild steel

Results Shown For:

- Mild steel
- Conical Punch

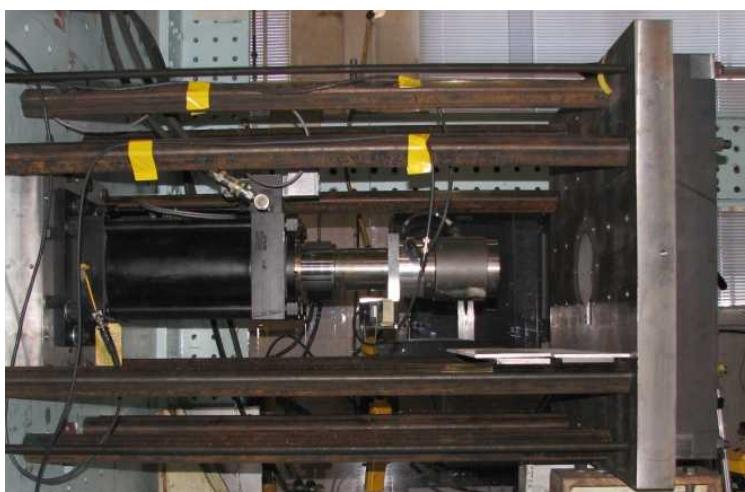
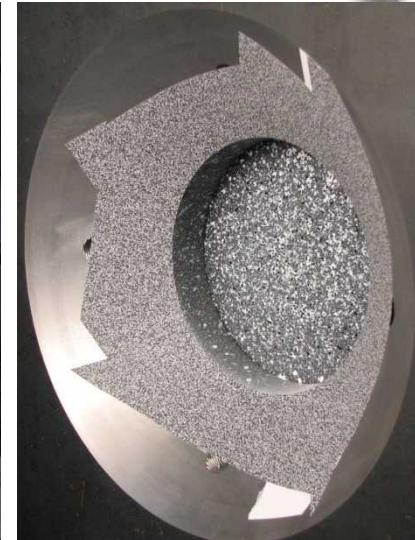
The quasistatic testing was done at Sandia's large scale test frame



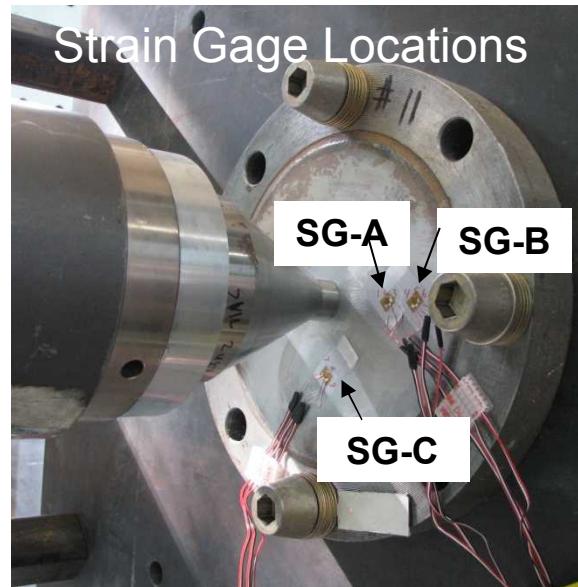
Large Load Frame



DIC Stereo Rig

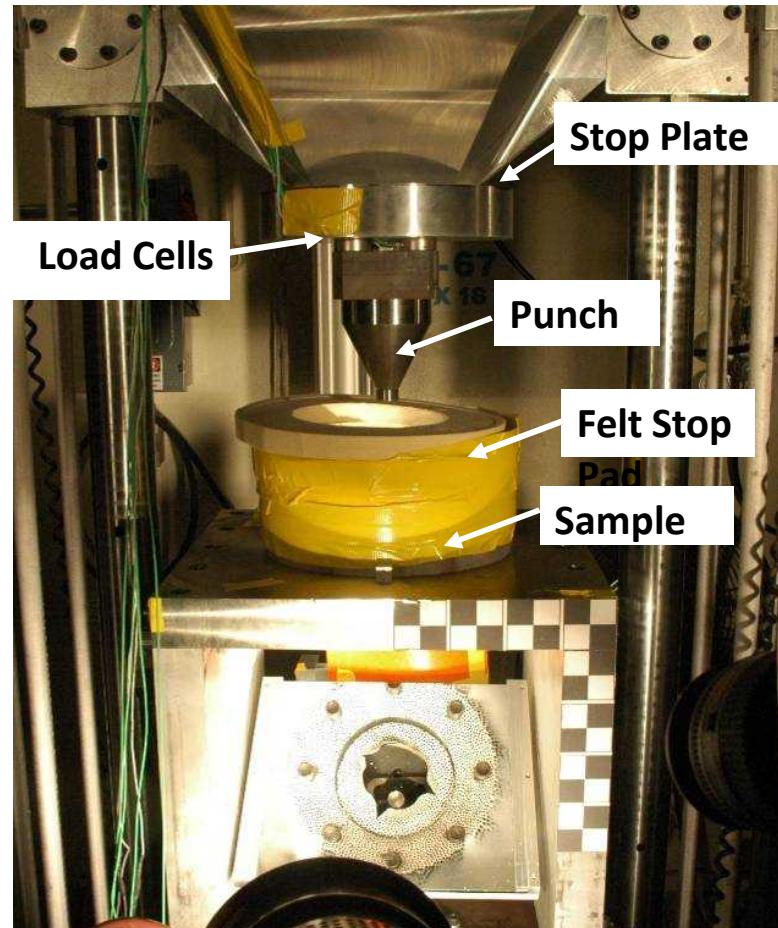
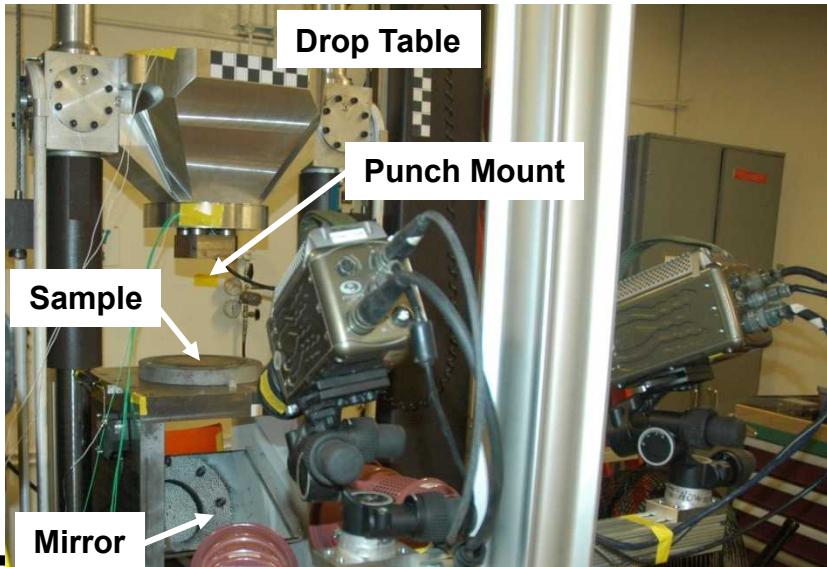


Strain Gage Locations

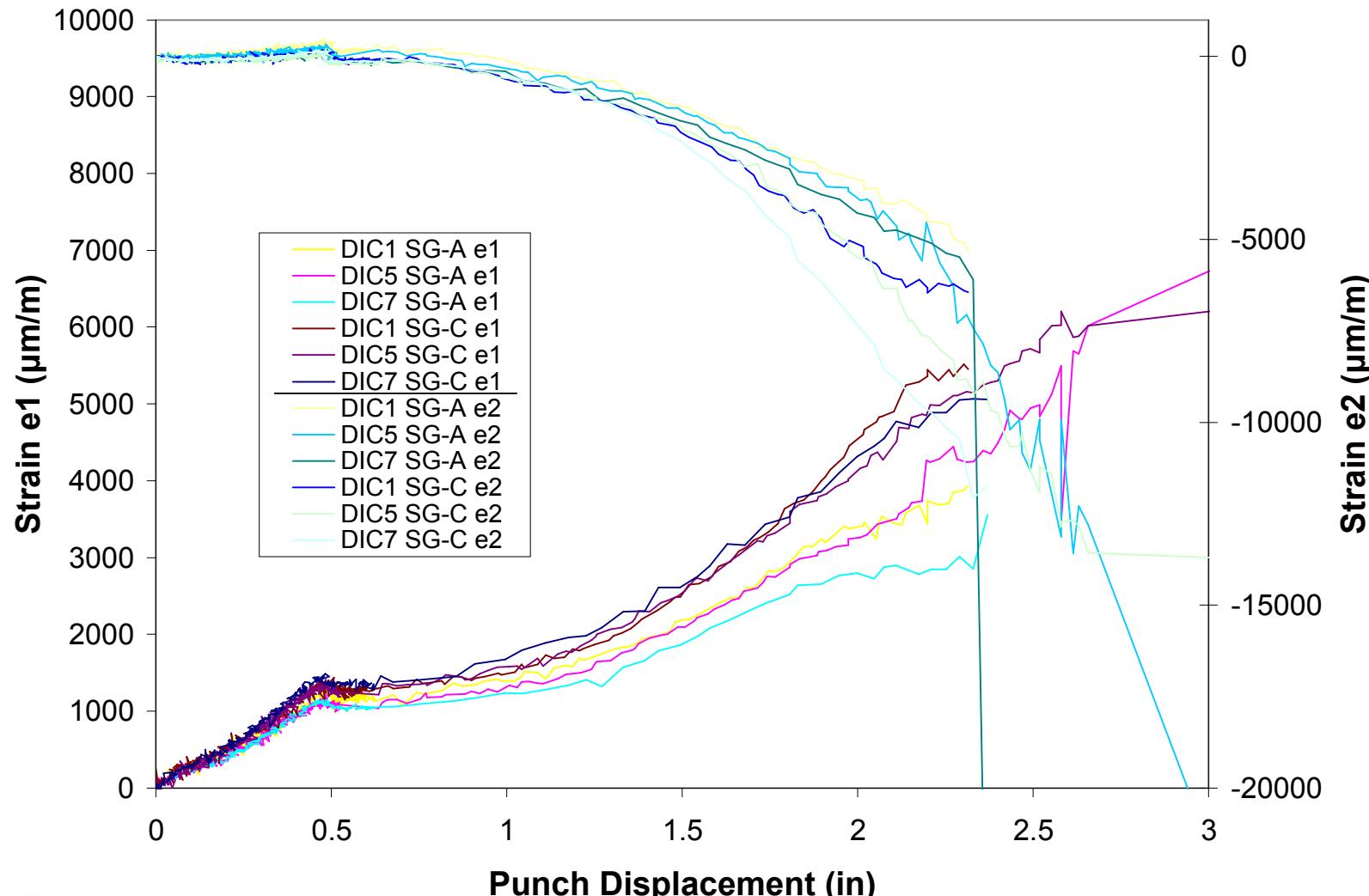


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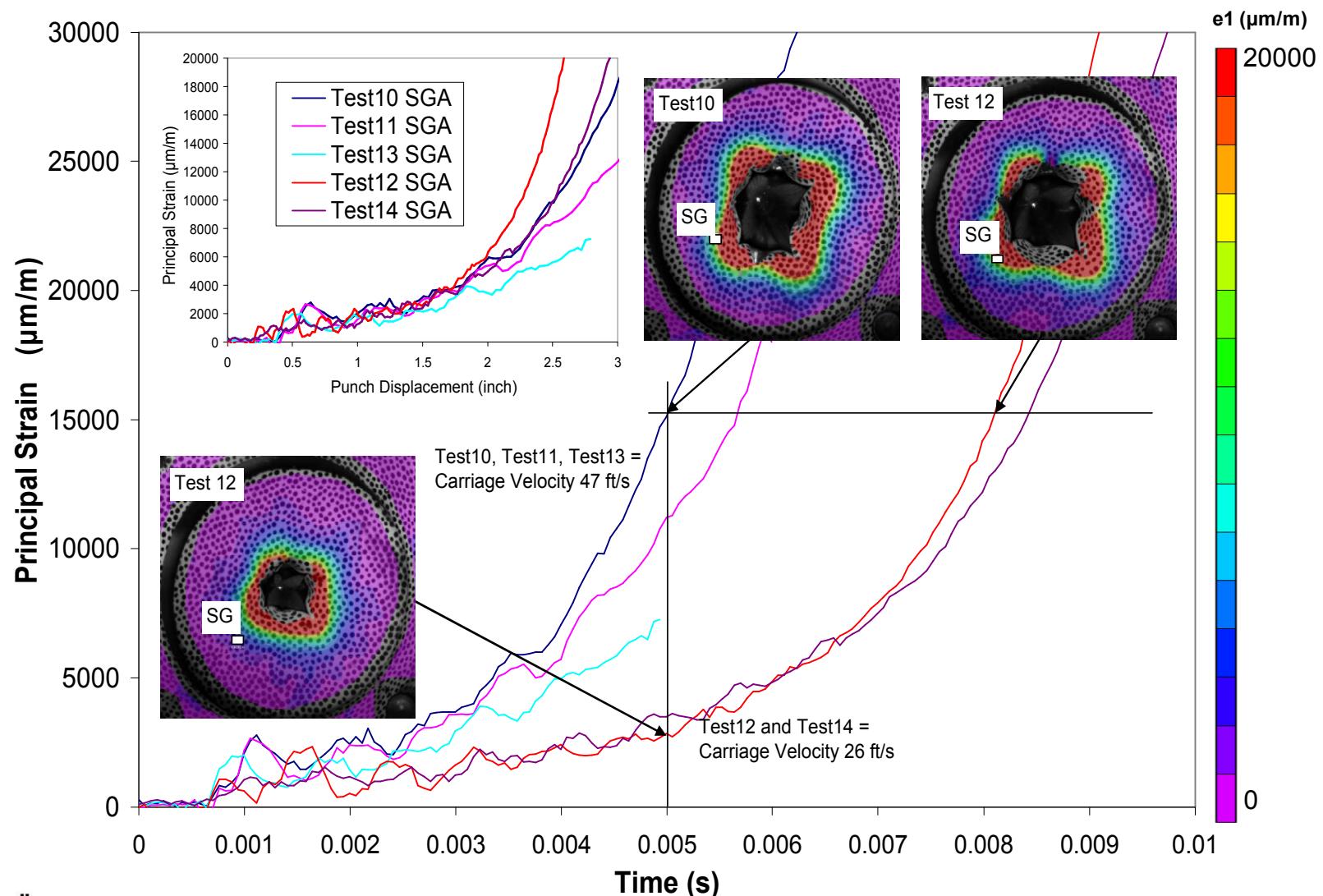
Dynamic testing was done on Sandia's drop tables



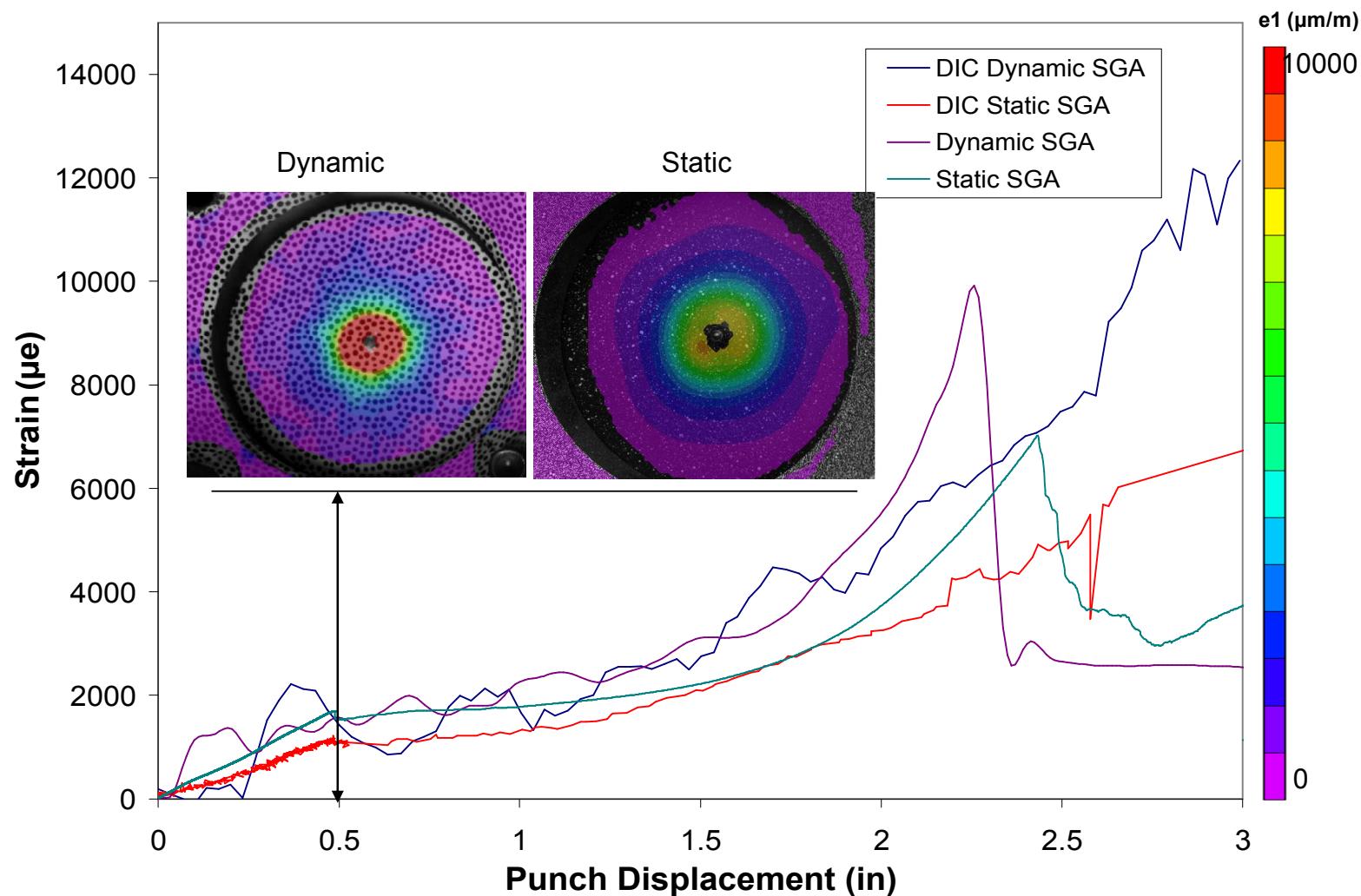
Quasistatic results showed excellent repeatability for each sample and punch type



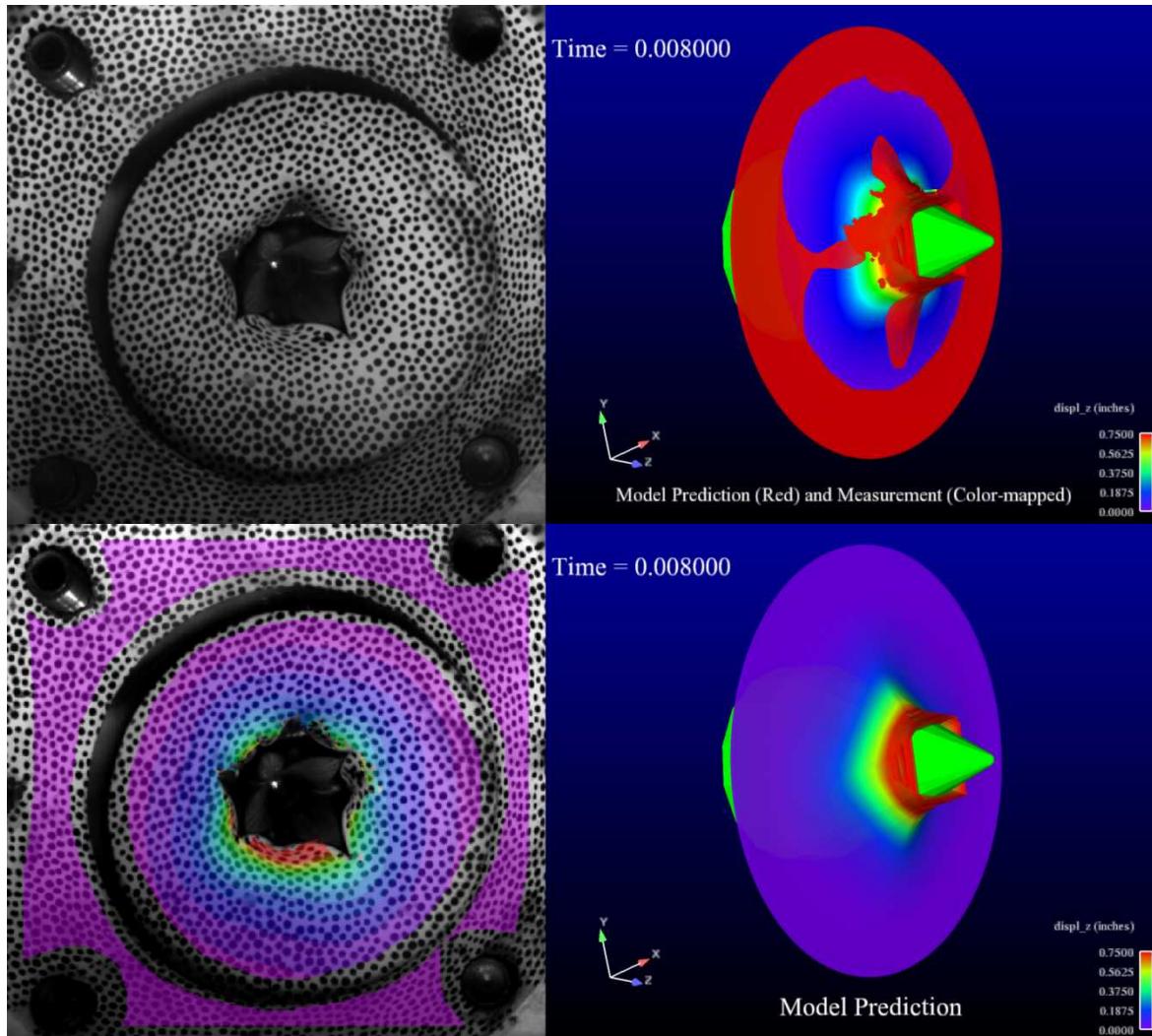
Dynamic results using two different carriage speeds



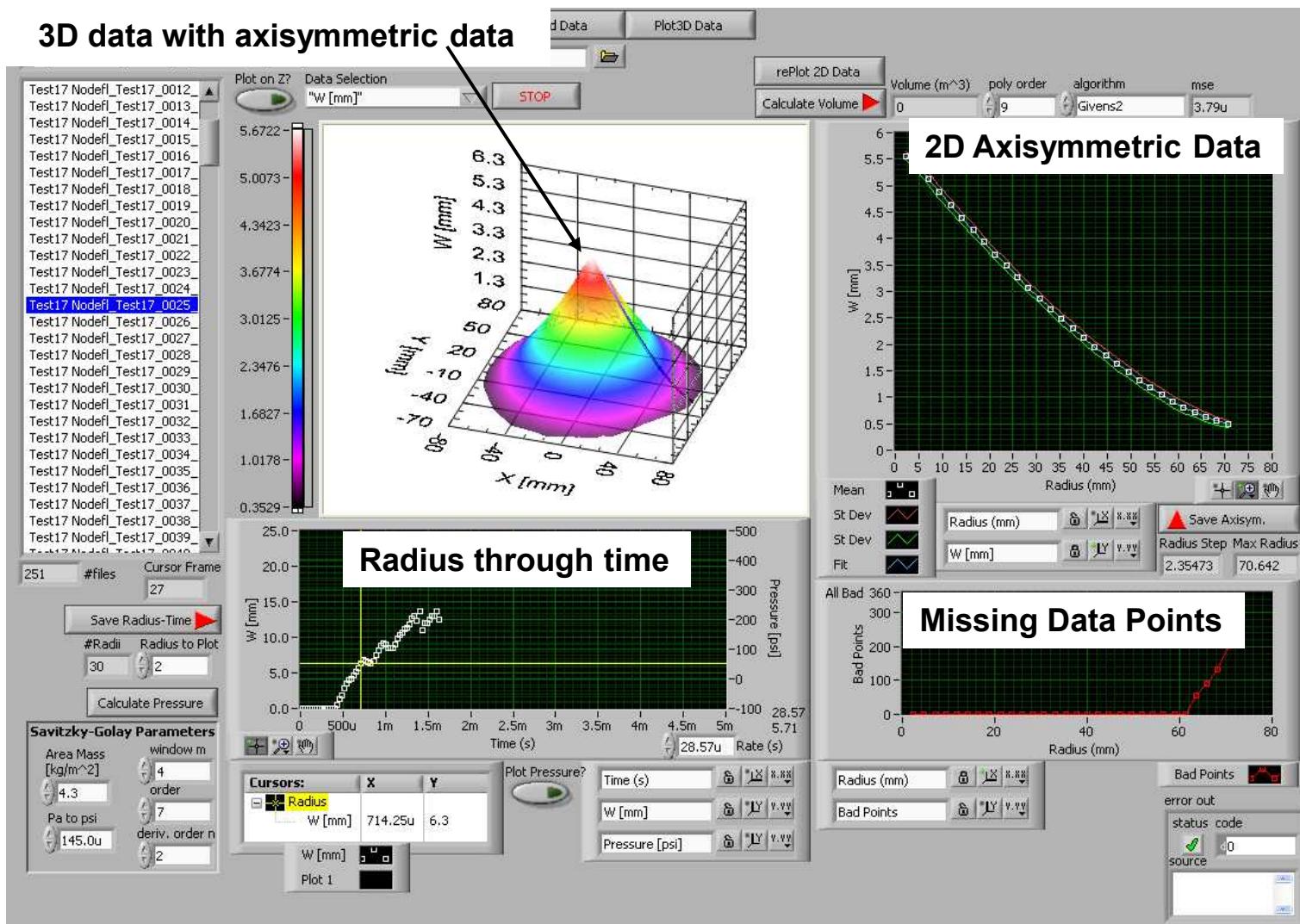
A successful comparison was obtained between the quasistatic and dynamic results



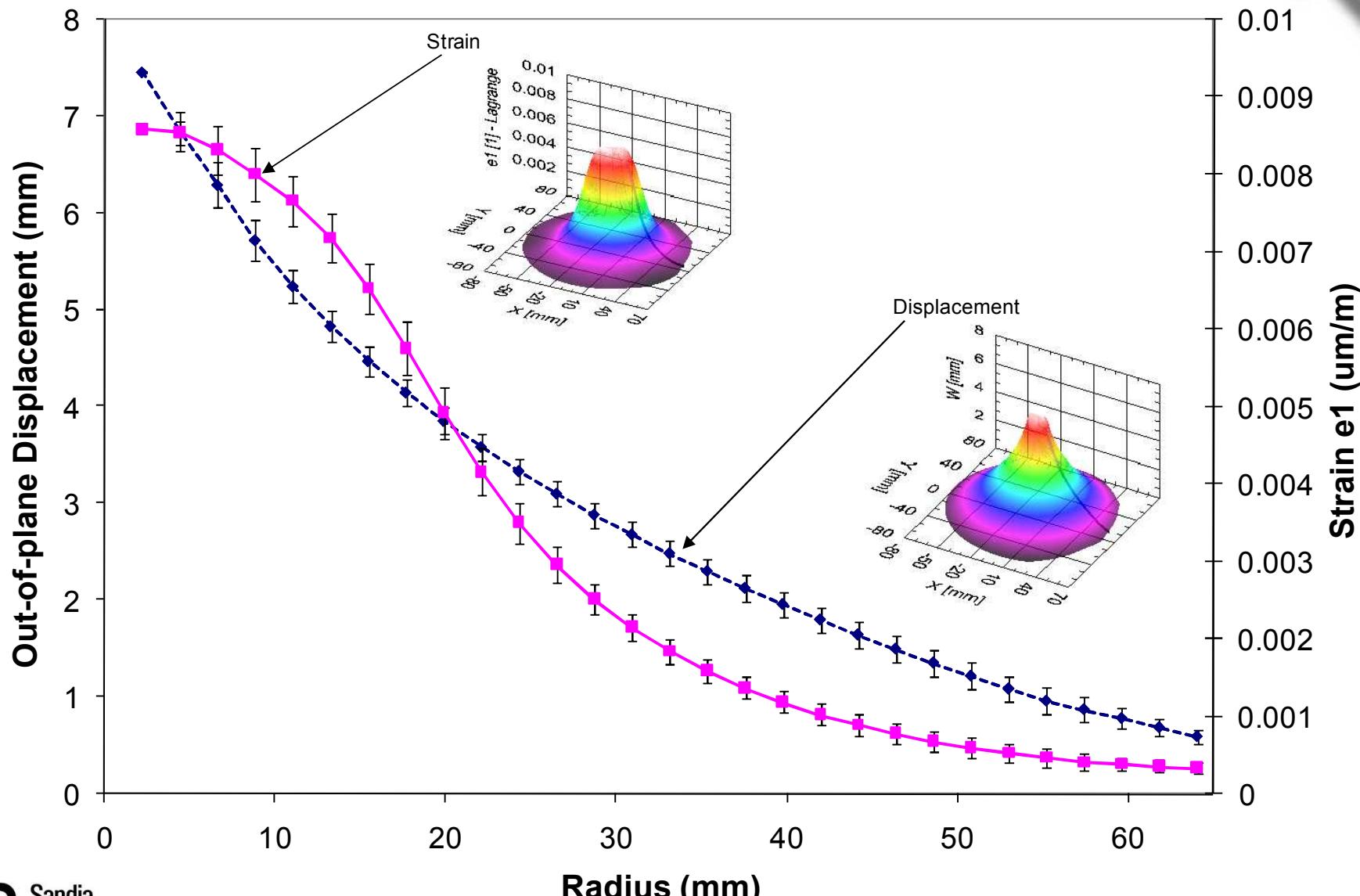
Many finite-element codes and the corresponding experiments are designed to exploit axisymmetry



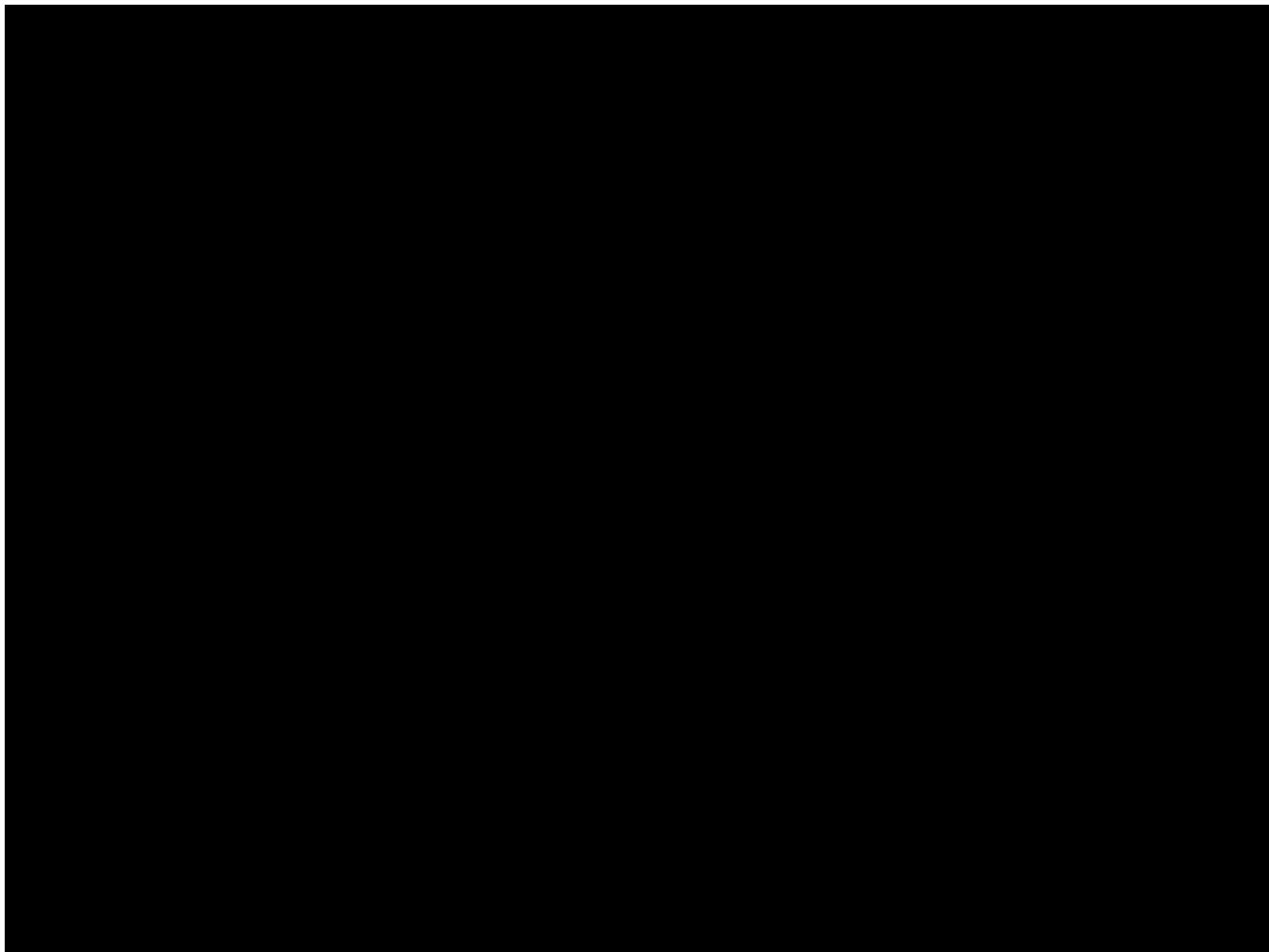
Software was written to extract the data from Vic3D and then create axisymmetric results



The boundary conditions of the experiment can be checked

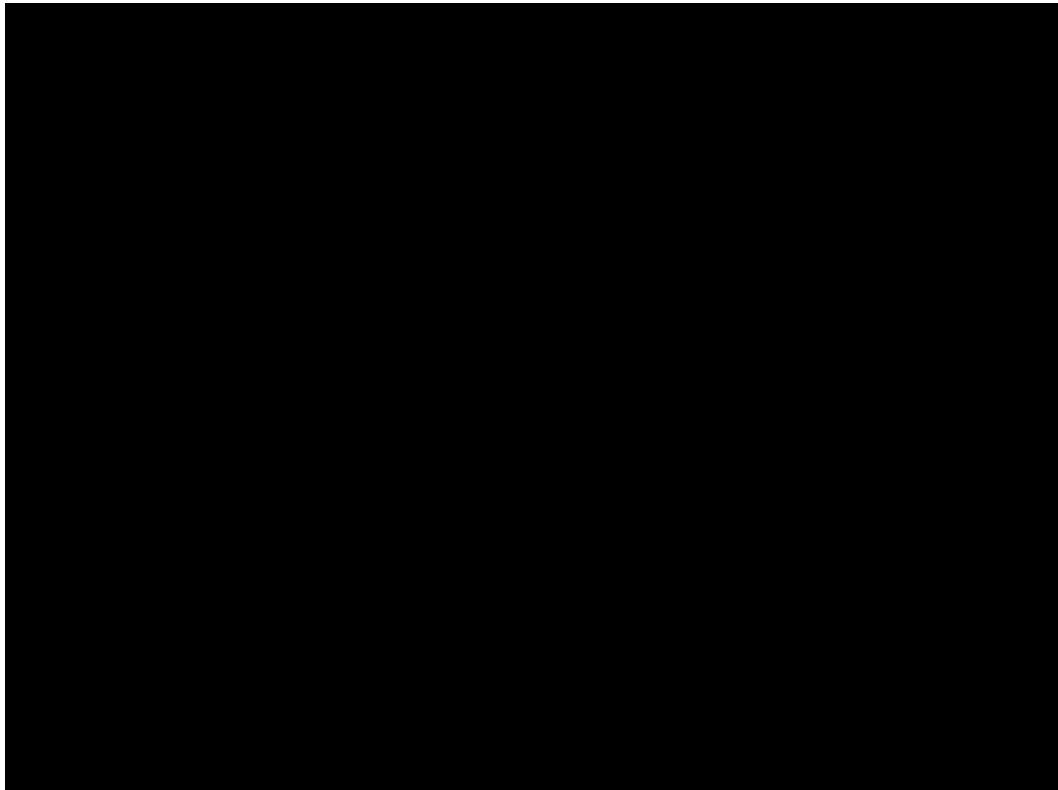


Full-field experimental versus model comparison (preliminary)



Future work

- Do tests with strain gages on the front side of the plate (DIC side)
- Use DIC to test tensile samples and measure strain in the neck region for model material property determination



Questions?