SAND2014-18063D

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CAD/FEM Compare Tool

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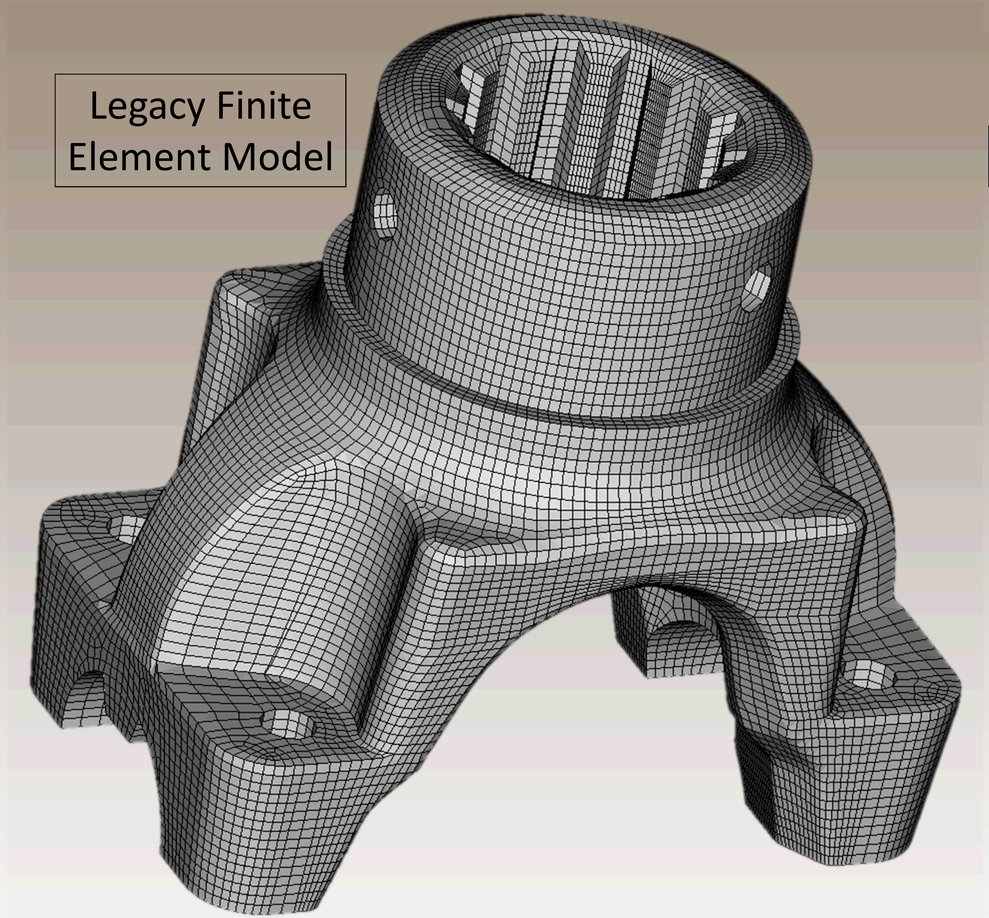
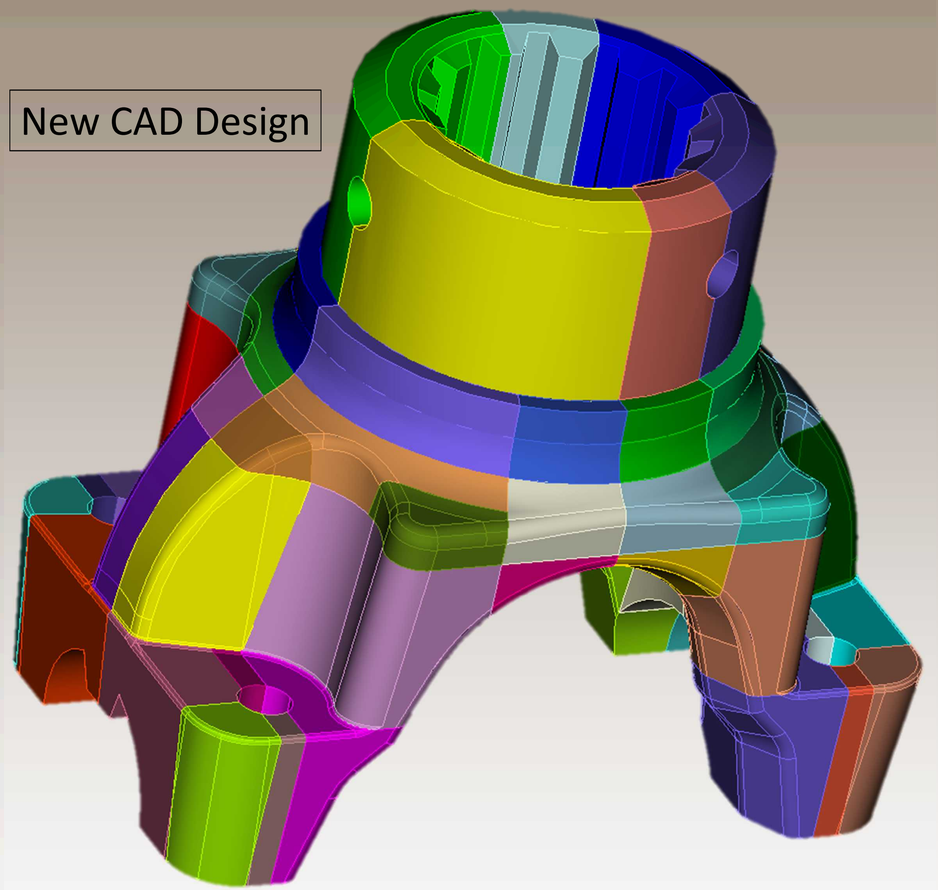
Description: The CAD/FEM Compare Tool is used to compare, using proximity checks, a CAD solid model to a finite element mesh. Resulting mismatches are presented to the user and visualization tools are provided for further examining the discrepancies.

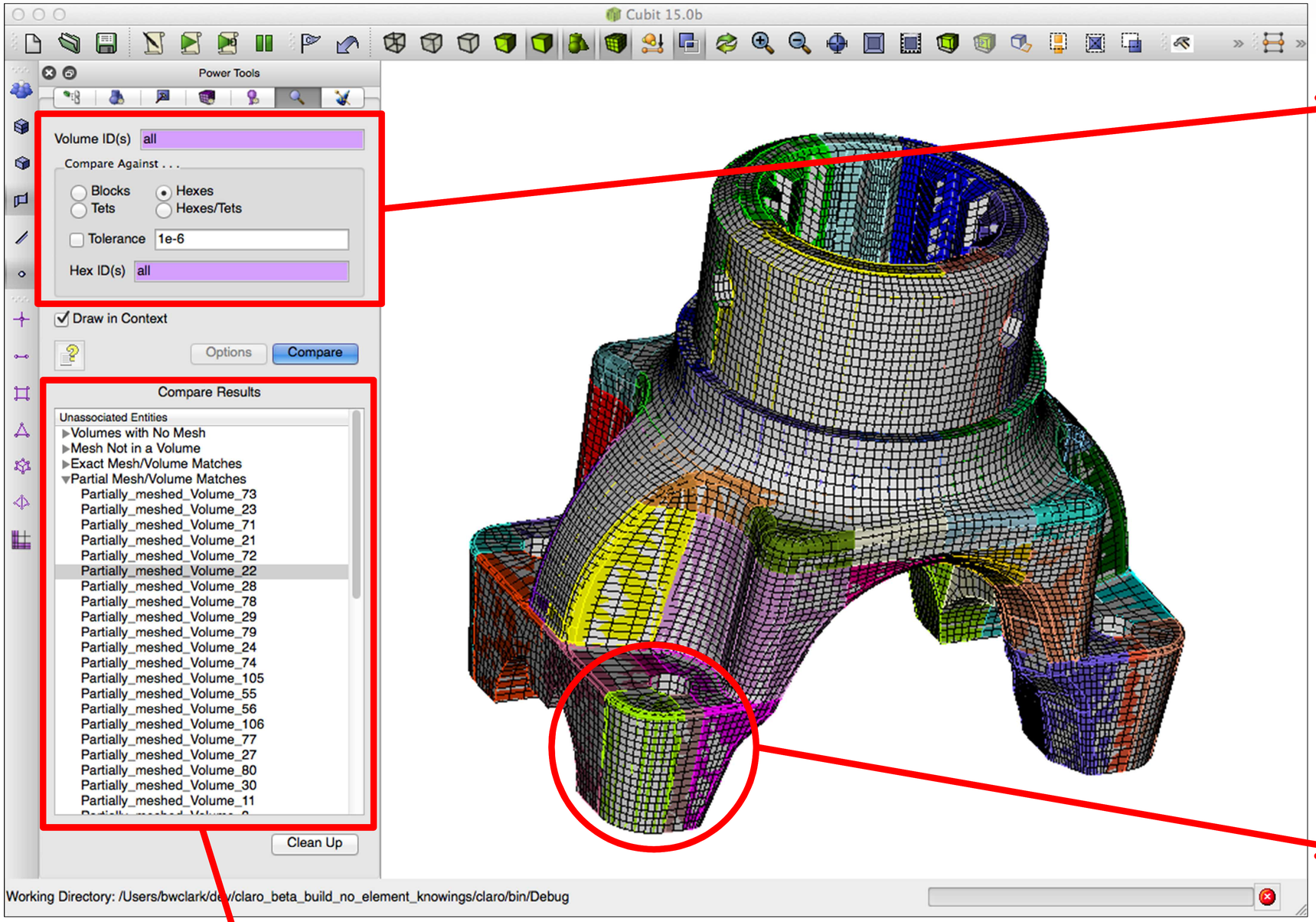
Driver: Analysts often have legacy finite element models from previous designs and want to know how well they correspond to a new design.

Impact: The tool has already proven beneficial in discovering CAD/FEM discrepancies in large system models due to design iterations/changes. It has also helped identify assembly errors when assembling component meshes for large systems.

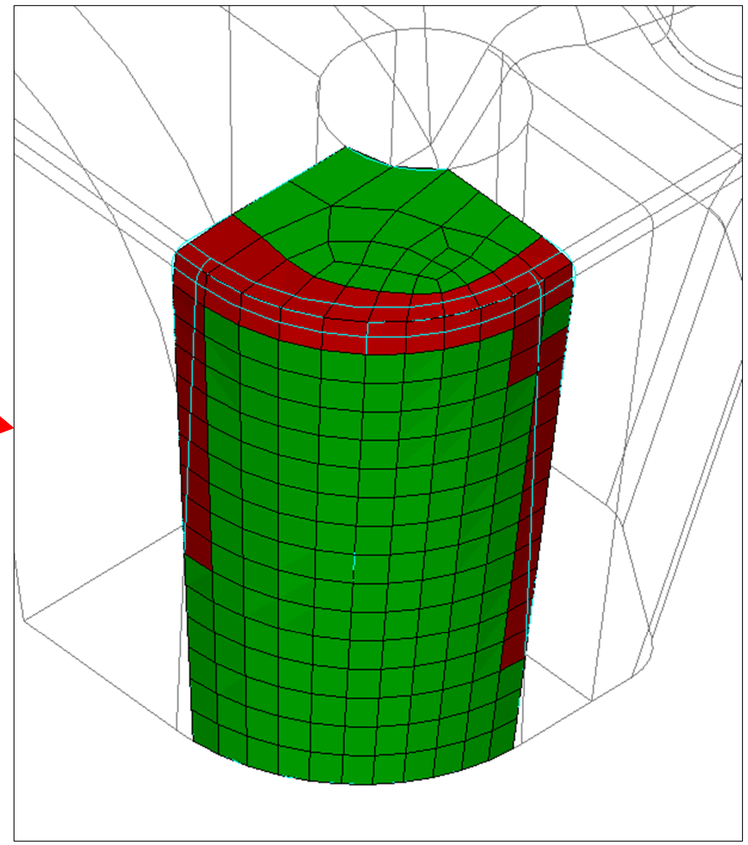




Future Work: Iterate with users on additional results from comparison as well as additional visualizations of results. Performance improvements on large models (10s of millions of elements and 1000s of volumes).



Input parameters. CAD volumes and finite element tets, hexes, and blocks are used for comparison. A user-specified tolerance determines allowable slop in the comparison.



Results. Results are grouped so that the user can easily examine which portions of the new design match the legacy mesh well and which portions do not.

Visualization. Individual mismatches between CAD/FE models are visualized in the context of the whole part. Locations where the mesh does not match the topology and shape of the CAD model are drawn in red.

U.S. DEPARTMENT OF ENERGY
National Nuclear Security Administration

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SAND No. 2011-XXXXP