Fall, 2009

Volume 7, No. 4

DEFORM™ News

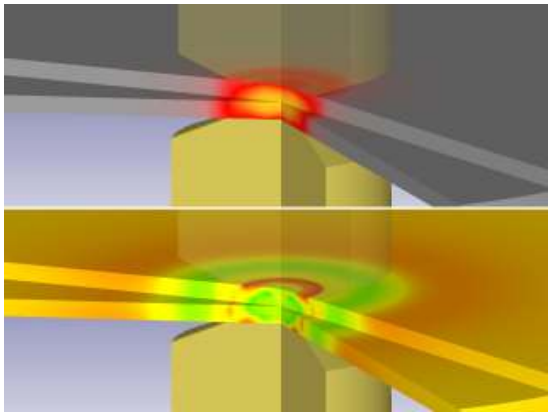
Events:

- November 3 & 4, 2009: The Fall DEFORM User Group Meeting will be held in at the Bridgewater Banquet and Conference Center in Columbus, Ohio.

Training:

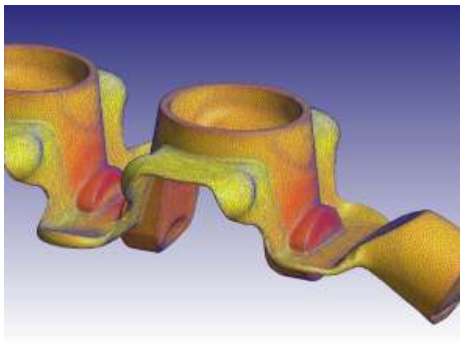
- November 4 & 5, 2009: DEFORM Advanced training will be conducted at SFTC in Columbus, Ohio after the User Group Meeting.
- December 8 & 9, 2009: DEFORM-2D training (includes DEFORM-F2) will be conducted at SFTC in Columbus, Ohio.
- December 10 & 11, 2009: DEFORM-3D training (includes DEFORM-F3) will be conducted at the SFTC office.

64-bit Updates



A 64-bit FEM engine is currently being introduced for DEFORM-3D. The new FEM engine takes full advantage of systems with more than three GB of RAM. This will allow users to simulate larger and more detailed models. For example, the forged yoke shown below was simulated with 800,000 elements. Pre- and postprocessors will remain 32-bit, so problem setup and review can be accomplished on a desktop PC, regardless of the FEM engine. A 64-bit FEM engine for Linux is currently available. A WINDOWS version will be available soon.

Solver speed improvements are under continuous development. Recent updates have resulted in 10%-50% speed improvement in test cases.



Resistance Welding

Resistance spot welding is a common joining process. It is used in the automotive industry to join sheet metal components. Ideal weld parameters are typically determined by extensive trial and error. More efficient process optimization is possible by modeling these processes with DEFORM. For example, one detailed study coupled thermal, mechanical, microstructural and electrical effects in a single model, as shown.

The investigation identified the critical process variables as applied current, electrode force, welding time and holding time. Applied current and electrode force governed contact resistance and temperature (top). Welding and holding times affected the cooling rate and phase transformations. Mechanical, thermal and microstructural responses contributed to the stress evolution (bottom) and distortion. This powerful coupling allowed engineers to efficiently optimize the entire process.

Hardware Performance

SFTC continues to monitor simulation performance of computer systems. Systems with Nehalem-based Intel processors continue to provide the fastest speeds. Multi-core computer system pricing is now very affordable. Entry-level and high-end Core i7 desktop systems cost as low as $800 and $2000, respectively. Workstation system prices start at about $2500.

SFTC recommends a 64-bit OS and at least 6 GB of RAM for users that intend to run DEFORM-3D 64-bit. Users considering parallel processing upgrades should contact SFTC for hardware and licensing details.

DEFORM™

Design Environment for FORMing

Releases

DEFORM Version 10.0 was released in July 2009 and includes the following components:

- DEFORM-2D
- DEFORM-3D
- DEFORM-F2
- DEFORM-F3
- Integrated DEFORM (Beta)
- Integrated DEFORM-F23 (Beta)

Major functionality improvements occurred in the following areas:

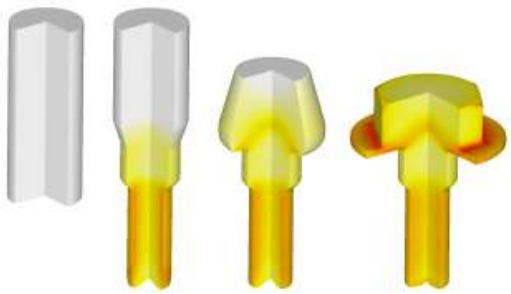
- Shape rolling
- Ring rolling
- Induction heating
- License manager
- Extrusion

A service pack 1 is being developed and tested to resolve issues discovered in version 10.0. Potential improvements are being studied and developed at this time, as is a schedule for the service pack.

Version 10.0 Release

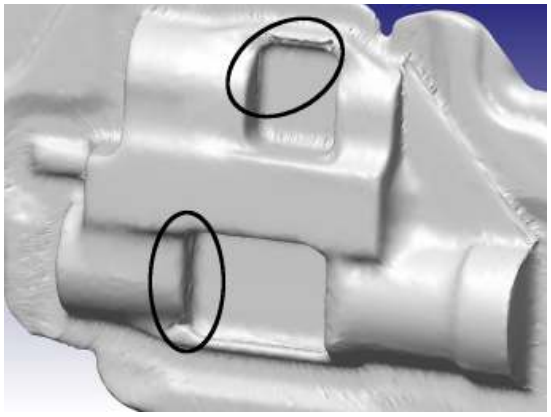
DEFORM V10 represents a major milestone in DEFORM history. The database structure supports 2D and 3D models in the same file. Based on this, all DEFORM systems will share the same version number and release schedule. New features launched in the V10 release include an integrated 2D/3D interface, 3D offset FLOWNET improvements and 2D-to-3D point tracking capabilities.

An integrated 2D/3D interface permits more efficient modeling of processes consisting of 2D and 3D operations, like the bolt progression shown below. Only one pre- or postprocessor interface needs to be used. The integrated preprocessor contains new tools for converting the 2D geometries and meshes to 3D models. The integrated postprocessor streamlines results evaluation and animation generation. It also allows the 2D operations to be toggled between 2D and 3D view modes.



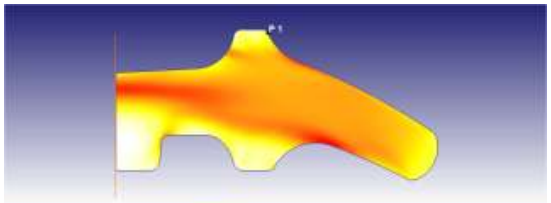
The FLOWNET feature of DEFORM is a powerful tool for the prediction of folds and flow defects. Such flow defects are commonly referred to as piping, suck-in or flow-by defects. The offset surface FLOWNET has been significantly improved from earlier versions of DEFORM when studying complex 3D results. In V10, 3D FLOWNET tools have been totally redeveloped to provide world-class defect detection capabilities.

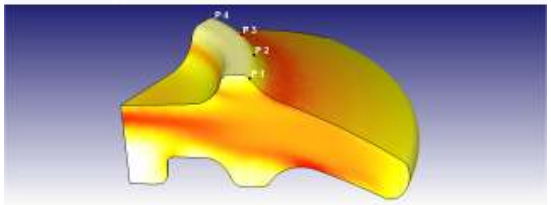
The 3D offset FLOWNET is now shown as a shaded surface instead of a wireframe mesh. During FLOWNET generation, surface facets tend to stretch at sharp corners and fillets. DEFORM adaptively refines these facets to better follow the surface geometry. This adaptive refinement improves the shaded FLOWNET representation, making it easier to identify subtle flow defects.



A new feature added in V10 is the Built-In FLOWNET. It is a 3D offset FLOWNET that is defined within the preprocessor. Generation of this FLOWNET happens during the FEM solution, not during postprocessing. Adaptive refinement is also performed during remeshing. Once the FEM solution is complete, the built-In FLOWNET can be immediately viewed in the postprocessor. Laps are shown below in this actuator forging with this improved capability.

Finally, linked point tracking between 2D and 3D operations is now possible. Points can be tracked from a cross-section to solid model or vice-versa. Points that are tracked between 2D and 3D are automatically plotted on sections of the 3D part, as shown below. Linked state-variable and user-variable history plots are also supported via the integrated point tracking.





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