Summer, 2005

Volume 3, No. 3

DEFORM™ News

Events:

- The Fall DEFORM Users Group Meeting in North America will be held on November 1 & 2, 2005 at a location to be determined.

Training:

- July 12 & 13, 2005: 2D training will be conducted at SFTC in Columbus, Ohio.
- July 14 & 15, 2005: 3D training will be conducted at the SFTC office.
- Advanced training will tentatively be held on November 3 & 4, 2005 at the SFTC office, in conjunction with the spring DEFORM Users Group Meeting.
- The tenth annual Die Stress Analysis Workshop is scheduled on August 24 & 25, 2005 at Marquette University in Milwaukee, Wisconsin. Mark your calendars now.

DEFORM™

Design Environment for FORMing

Floating License:

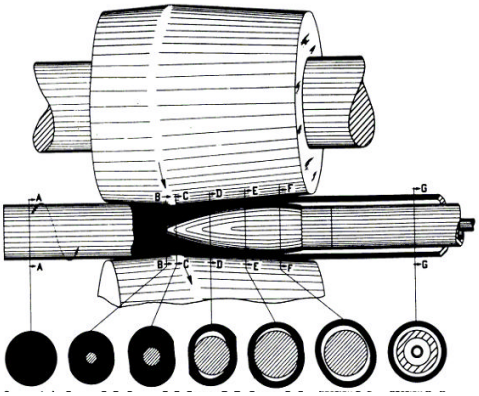
The floating license is growing in popularity among DEFORM Users. This implementation provides the flexibility to share licenses among users in different locations or plant sites in one country. Additionally, it provides on-line access to simulation results throughout the company.

The license administration is conducted on a server on the company network, while DEFORM is run on 'local' computers within the network. Since the graphics operations are performed locally, there display times are fast. The floating license is available for all DEFORM Systems.

SFTC is providing a second preprocessor and postprocessor with each floating license. We will be pleased to discuss how the floating license fits your applications and environment.

Tube Piercing:

Rotary tube piercing is a hot-working process used to produce long, thick-walled seamless tubes. It is based on the principle that tensile stresses are induced at the center when a round bar is subjected to non-uniform radial compressive force. The cyclic application of these stresses results in a cavity forming at the center of the bar.



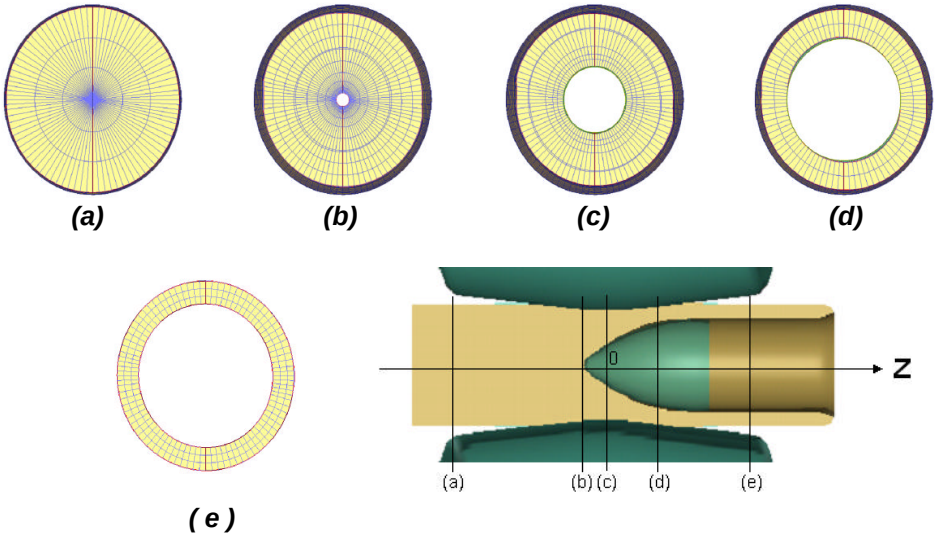
This schematic illustrates tube deformation resulting from the rolls and center plug.

Rotary tube piercing uses a pair of rotating rolls, whose axes are skewed to one another, to pull the round bar through the rolls. An internal plug assists the operation by expanding the hole and sizing the inside diameter of the tube, as shown.

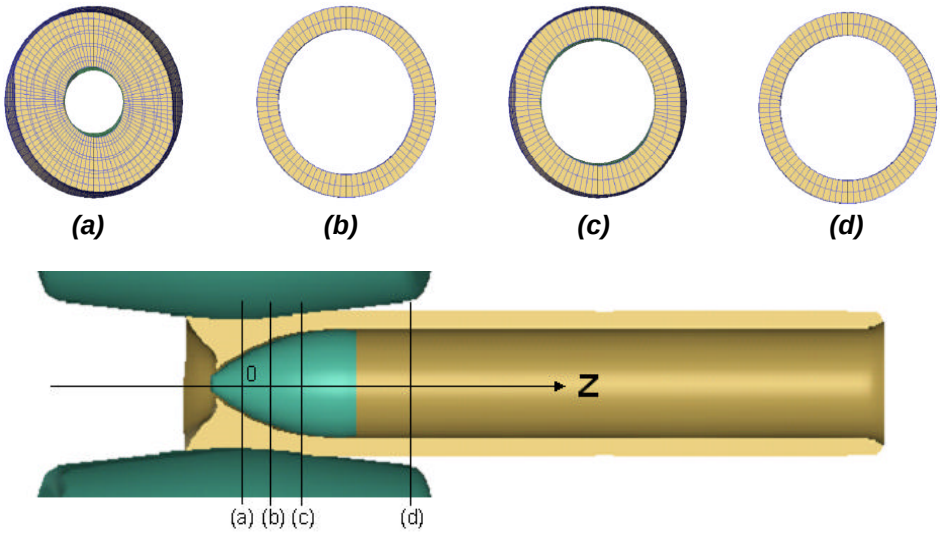
Historically, the simulation of this process was prohibitively time consuming, using any commercial software. Rotational motion, number of revolutions and changing contact require a large number of time steps to accurately simulate the process.

To simulate tube piercing, an ALE method was developed to allow the radial and longitudinal motions to use the Lagrangian formulation and the circumferential motion to use an Eulerian formulation. The rolls and plug were simulated as rigid objects. The workpiece was modeled as an isothermal deformable body with a rigid-plastic material behavior. The workpiece was comprised of 15,000 brick elements. Rotational symmetry was used.

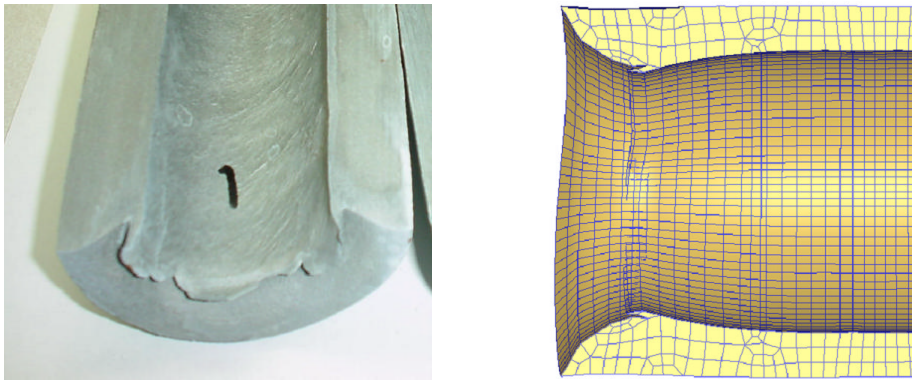
The wall thickness of the pipe is continuously reduced between the plug and rolls, resulting in a round tube being produced. Predicted cross-sections of the workpiece are shown at intermediate stages and at the end of the process. The progression of radial deformation, tensile stress, fracture, ovality and sizing of the inside diameter can be observed throughout the process. Of particular interest is the prediction of the backend defect formed at the end of the process.



Cross-sections are shown at (a) z = -14″, (b) z = -2″, (c) z = 0″, (d) z = 4″ and (e) z = 10″ at the start of piercing.



Radial cross-sections are shown at (a) z = 0″, (b) z = 2″, (c) z = 4″ and (d) z = 10″ at the end of piercing.



The backend defect is shown on the 10.5″ billet on the left. The DEFORM-3D simulation shows the same behavior on the right.

Releases

DEFORM is now developed for the HP platform using HP-UX version 11.23. DEFORM will no longer be supported on HP-UX version 11.22.

DEFORM-2D and DEFORM-F2 versions 8.2 were released in June. Enhancements include:

- Simulation graphics show realtime simulation progress.
- Additional DXF entities are now supported.
- Phase transformation kinetics models in 2D have been improved.
- Elasto-plastic convergence has been improved for rate-dependent materials.
- Large IGES files can be imported into DEFORM-2D.
- Truncation temperatures have been added to minimize the influence of data extrapolation issues.
- A proximity tolerance is available for geometry imports.

DEFORM-3D and DEFORM-F3 versions 5.1 were released in early July. Improvements include:

- Simulation graphics were added.
- Coupled object positioning allows multiple objects to be positioned.
- Self contact is implemented in DEFORM-3D.
- Geometry primitives are incorporated into the preprocessor.
- Phase transformation kinetics models in 3D have been improved.
- Elasto-plastic convergence has been improved for rate-dependent materials.
- Friction windows have been implemented in DEFORM-3D.

For a complete list of all the improvements, please refer to the release notes on the DEFORM User's area.

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