DEFORM News

Training

SFTC will offer DEFORM training for U.S. and Canadian customers on the following dates:

- August 13-15 (online)
- October 15-17 (in-person)

Detailed training and registration information is available on the DEFORM website.

Customers in other regions should contact their local DEFORM distributor for training options.

Events

SFTC will participate in the 2024 IFHTSE World Congress, taking place in Cleveland, Ohio from Sept. 30 to Oct. 3. SFTC will give a presentation titled "Coupled CFD and Part Distortion Modeling for Gas Quenching Applications".

The Fall 2024 DEFORM UGM will be held on Oct. 29-30. Active users should expect more details soon.

Careers

Please visit the SFTC website to view the current career opportunities available in areas such as sales, support and software development.

V14 Release

The next major release of DEFORM has recently been launched, with many exciting new applications, capabilities and features available to users.

Numerous object type and material data features were added including elasto-plastic porous and General Neo-Hookean (Hyperelastic) constitutive models, Barlat (1991) anisotropy and Yoshida-Uemori hardening models.


Before   After
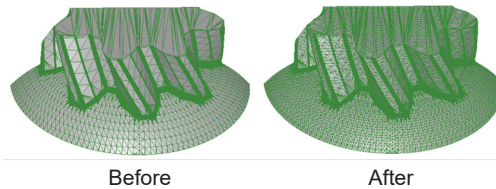
A geometry refinement tool adds built-in STL surface tessellation support (left). It replaces the manual initial mesh refinement technique that had been used to improve initial mesh generation control and output.

The new Construct by Subtraction tool creates a geometry and conforming mesh by Boolean subtraction (below). It simplifies the creation of environment or fluid volumes for induction heating and computational fluid dynamics (CFD) models.
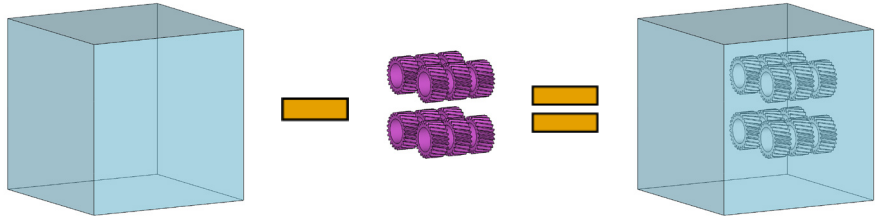

The 2D mesher has been improved with multiple boundary and multiple material group support. Local remeshing based on 2D cross-section windows was added for 3D brick meshes. 2D mesh windows were also added to 3D brick meshing in sheet applications. Finally, the Mirror/Merge tool now supports rotational symmetry (right) in addition to mirror symmetry.
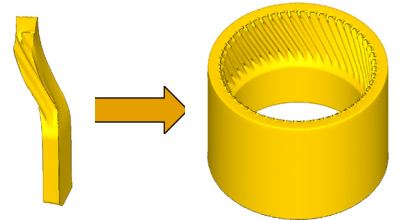

New contact features make it easier to define inter-object relationships, particularly in assemblies containing many objects. The Examine tool summarizes the status of objects and contact pairs. Its object status highlighting helps users ensure that all objects are sufficiently defined. The Explode View feature (right) provides a temporary display mode that separates objects, simplifying object picking and review.

A secondary step increment control has been introduced for database step saving. It will automatically alter the step save increment when a process condition (time, stroke, load, contact area ratio or minimum die distance) reaches a user-defined threshold.

DEFORM®

Design Environment for FORMing
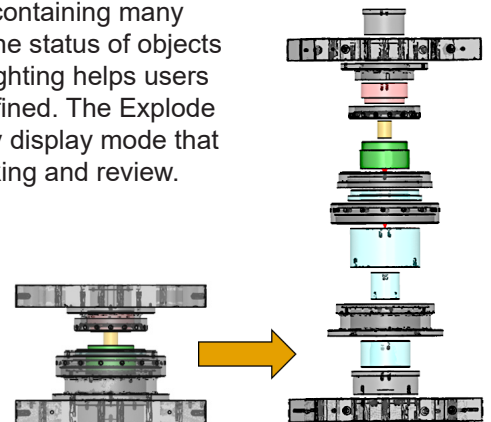
An innovative multi-ram hydraulic press model has been added to DEFORM-3D. It supports complex forming sequences involving multiple, independent punches that move in different directions. This advanced tool allows a complete cored forging process to be modeled using only a single operation (below; left).

Measurement location
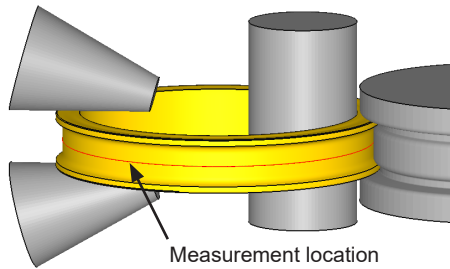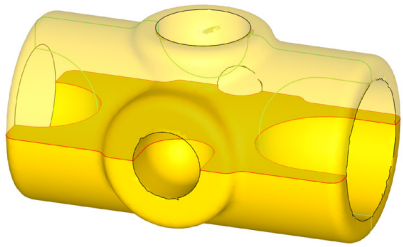
The Ring Rolling template gained support for a user-specified ring diameter measurement location (above; right). The tracked inner or outer diameter is utilized in stopping and movement controls that depend on ring diameter or growth speed. A ring roller PID control was added to support these features.

Better support for tet meshes and Boolean operations has been incorporated into the Shape Rolling template. Pass table, environment and contact setting enhancements simplify multi-pass shape rolling modeling effort.

The Partial Domain solver and Quick Evaluation method were introduced to improve simulation speed in spinning, flow forming, and orbital forming applications.
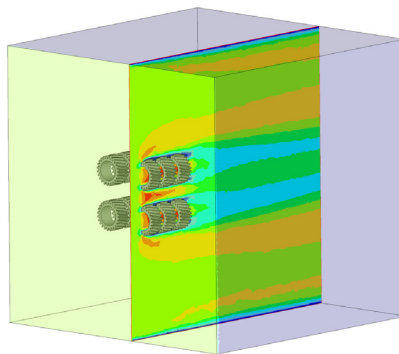
CFD capabilities have been developed, with initial focus on gas quenching applications. The CFD model (right) predicts local heat transfer coefficients (HTCs) on objects due to fluid flow. A coupled CFD to finite-element modeling (FEM) method passes the CFD HTCs to a quench distortion FEM simulation.

Induction heating simulation capabilities were extended with support for 2D plane strain model symmetry, B-H curves, hysteresis losses, electrical/magnetic field intensities, electrical current density and magnetic flux density.

Processing maps (below) were introduced to provide a better understanding of hot deformation mechanisms. Two types of processing maps can be calculated from existing flow stress data. The power dissipation efficiency map (left) evaluates hot workability, while the instability map (center) predicts processing conditions at which metal flow is unstable (red). The new instability state variable highlights where unstable flow takes place within a workpiece (red), due to certain local temperature, strain and strain rate conditions (right).
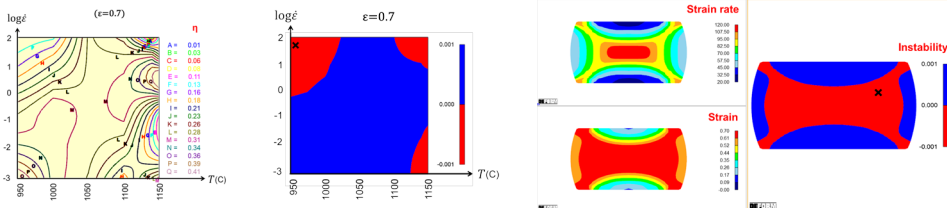
DEFORM continues to be the state-of-the-art solution for material modeling. Mechanism-based grain modeling of continuous (CDRX) and geometric (GDRX) dynamic recrystallization was implemented for aluminum alloys. A precipitation hardening model was introduced, based on classical nucleation and growth theories (CNGT). Finally, crystal plasticity FEM was added to the 3D Microstructure module for component-level deformation texture evolution.

DEFORM V14.0 Release

DEFORM V14.0, released in June, provides the following new features.

- Geometry refinement tool
- Geometry by subtraction
- Rotational mirror/merge
- 3D local remesh windows
- 3D sheet mesh windows
- 2D multiple boundary meshing
- 2D multiple material groups
- 2D/3D element deactivation
- 3rd rotation axis in 3D
- Multi-ram hydraulic press model
- Spinning Partial Domain solver
- Spinning Quick Evaluation method
- CFD solver for gas quenching
- CFD to FEM HTC coupling
- CFD boundary conditions (BCCs)
- 2D adaptive contact BCC
- Bolt assembly shrink fit BCC
- New electrical state variables
- B-H curves & hysteresis loss
- Nodal heat state variables
- Secondary step saving
- Stopping at exact target die load
- Gas/lube trapping object pairs
- Inter-object Examine tool
- Inter-object Explode View
- Thermal proximity contact
- Elasto-plastic porous model
- Density-dependent flow stress
- Voce flow stress model
- Yoshida-Uemori hardening
- Barlat (1991) anisotropic yield
- General Neo-Hookean model
- Load-stroke load summation
- ALE/CFD flowline tracking
- Processing maps & instability
- Ringing roll diameter location
- Custom ring diameter stopping
- Ring roller PID support
- Ring growth speed f(diameter)
- Axial roll movement f(diameter)
- Shape rolling enhancements
- Cogging/shape rolling boolean
- Aluminum CDRX & GDRX
- CNGT precipitation hardening
- Crystal plasticity FEM texture
- DEFORM-API enhancements

Full details are available in the V14.0 Release Notes.