Summer, 2013
Volume 11, No. 2

DEFORM™ News

Events:

- September 16-19, 2013:
  ASM Heat Treatment Conference in Indianapolis, IN
- November 6 & 7, 2013:
  DEFORM User Group meeting in Columbus, OH

Training:

- October 15-18, 2013: DEFORM training will be conducted at the SFTC office in Columbus, OH.
- December 10-13, 2013: DEFORM training will be conducted at the SFTC office in Columbus, OH.
- 2014 training dates to be announced

DEFORM Version 11

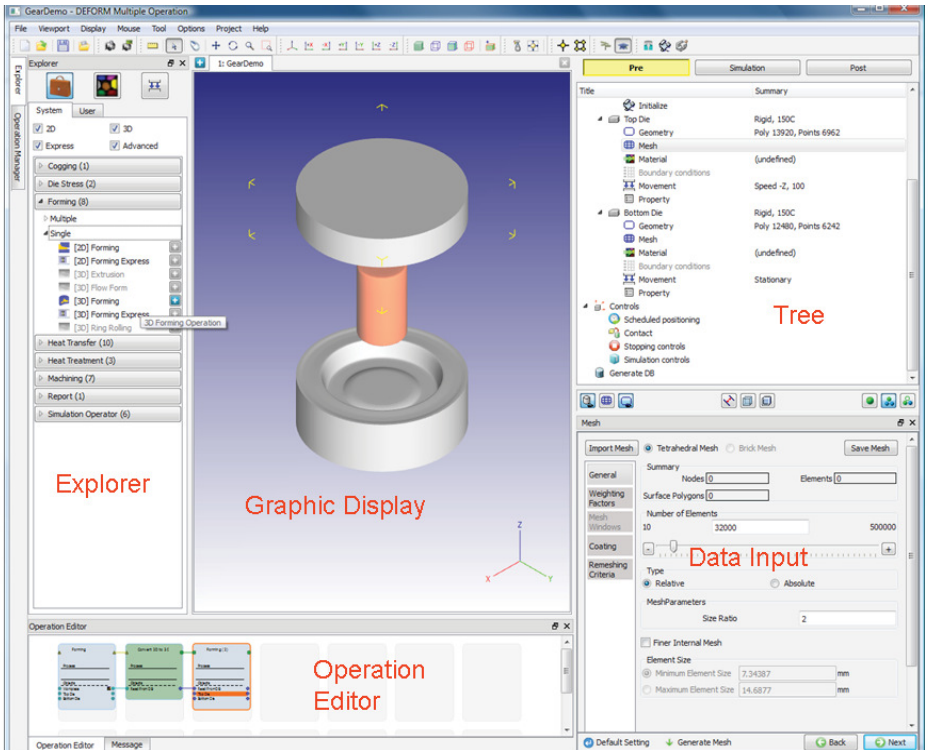
DEFORM version 11 contains a wide range of new, innovative features. It is the largest step forward SFTC has taken in a single release of DEFORM.

The centerpiece of version 11 is a redesigned, multiple-operations centered user interface.

- The interface includes flexible guided data input (similar to the current templates) for a wide range of processes.
- Many processes are integrated. Stand-alone templates for cogging, rolling, machining, etc are being phased out.
- Dissimilar processes can be sequenced. For example, the result of a cogging operation can automatically be passed to a furnace heating, then an upset operation.
- Multiple runs with small variations can be defined. This includes:
  - design of experiments (DOE)
  - true multi-variable optimization, including 2D and limited 3D geometry optimization
  - special post-processor for analyzing data from multiple runs using a range of surface response and sensitivity plots.
- A new batch post-processor automatically generates .pdf or Powerpoint format reports when a simulation completes, based on a user defined session file.

To support these enhancements, a new data structure has been introduced which provides better support for changing input conditions.

The system layout supports definition of multiple sequenced operations. The centerpiece is the **operation editor**. Each tile represents a single processing operation. It may be cogging, rolling, forging,

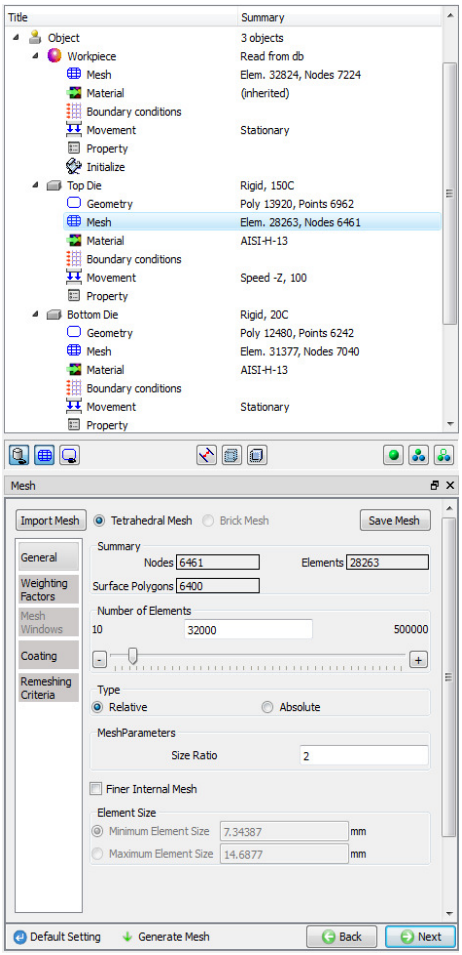


DEFORM™
Design Environment for FORMing

heat treatment, machining or any other valid DEFORM operation. Lines represent passing of data such as the workpiece, tools, etc. between operations.

The **explorer** provides a library of processing operation types, such as 2D forging or 3D rolling, which can be included in the operation editor.

The **tree** will be familiar to current DEFORM users who have used templates or the F2 or F3 products, but will be a new concept to those using our open interface. It is a flexible, guided system. The tree contains both object information (tool and workpiece geometry, mesh, movements) and general simulation information (interobject controls, simulation controls). Navigation is primarily through "next" and "back" buttons to step through the tree. The user can also click directly on any branch of the tree to jump directly to that input dialog.



Compatibility

File System

Version 11 will include both the old style (Integrated) and new style (Multiple Operations, or MO) user interfaces. The DEFORM database structure and underlying calculation components (finite element solver, mesh generation) are the same between the two interfaces. The MO system adds additional information which allows sequencing runs and DOE /optimization runs. This new information will not be recognized by the older Integrated interface.

Other New Features

Beyond the new user interface, there are a wide range of new features in the version 11 FEM solver.

Microstructure modeling capabilities are significantly improved. Crystal plasticity, mesoscale microstructure, grain size, and precipitate data can all inform metal flow behavior. Grain size evolution prediction is also enhanced by more sophisticated models.

There are also several new finite element matrix solvers, including an explicit solver, and new direct and iterative matrix solvers for implicit formulations. In general, these new features will only be supported in the new MO interface.

Transition

The transition for existing DEFORM users should not be difficult. There will be a few new concepts, such as planning for scheduled sequential operations in the multiple operations environment. The process of opening a new project is different. But beyond that, the basic information flow is the same as it is for all DEFORM simulations.

The new multiple operations template will be standard for all DEFORM licensees. The format and capabilities will vary slightly between 2D/3D and F2/F3 customers. The DOE/Optimization Module will be licensed separately.

SFTC will provide tutorials for the new system. Options for web based introductions are also being reviewed. More detailed information will follow with the software release.

DEFORM Version 11 Release

SFTC will continue to support the current integrated 2D/3D and F2/F3 interfaces as the new user interfaces are introduced.

DEFORM version 11 release includes:
- DEFORM integrated 2D/3D (similar look and feel to version 10.x)
- DEFORM integrated F2/F3 (similar look and feel to version 10.x)
- DEFORM new Multiple Operations (MO) interface with design of experiments and optimization capabilities (new look and feel interface)
- DEFORM next generation post-processor with automated report generation
- DEFORM License Manager version 3.0.4 with core licensing capability

A new DEFORM.PWD license file is required to run version 11.

Basic version 11 capabilities are supported by License Manager version 3.0.3 (released with version 10.2.1)

Design of experiments, optimization and core licensing require License Manager version 3.0.4

Major New Features

New multiple operations system

New cogging module

Much wider 64 bit support

New solvers:
- dynamic explicit elastic-plastic solver
- MUMPS sparse direct solver
- improved conjugate gradient iterative solver

New material models:
- crystal plasticity
- mesoscale
- improved handling of precipitation hardening alloys
- flow stress as a function of grain size

Scientific Forming Technologies Corporation

2545 Farmers Drive
Suite 200
Columbus, OH 43235
Tel: (614) 451-8330
Fax: (614) 451-8325
www.deform.com