

# DEFORM<sup>®</sup> News

## Training:

- December 6-9, 2016: DEFORM training will be conducted at the SFTC office in Columbus, OH.
- February 14-17, 2017: DEFORM training will be conducted at the SFTC office in Columbus, OH.

## Events:

- November 9, 2016: DEFORM annual Users Group Meeting will be held in Columbus, OH.
- April 4-6, 2017: SFTC will exhibit at Forge Fair in Cleveland, OH.

## DEFORM V11 User Interface

With its initial release in early 2014, the DEFORM V11 multiple operations interface offered improved convenience and capabilities for DEFORM model setup. Since then, continuous development has yielded a powerful, flexible and more stable system.

The core of the new system is the multiple operations user interface. Users can complete the setup for all operations in one preprocessing session. The model can then run start to finish without intervention. This system has enabled multi-variable design of experiments and optimization, with variables in each operation impacting a final objective.

Behind the scenes is a sophisticated new file system. Scheduling and automation of tool changes, positioning, remeshing, and other preprocessing functions are all handled seamlessly.

## Model Setup Overview

Setup starts with the definition of processes in the Operation Editor.

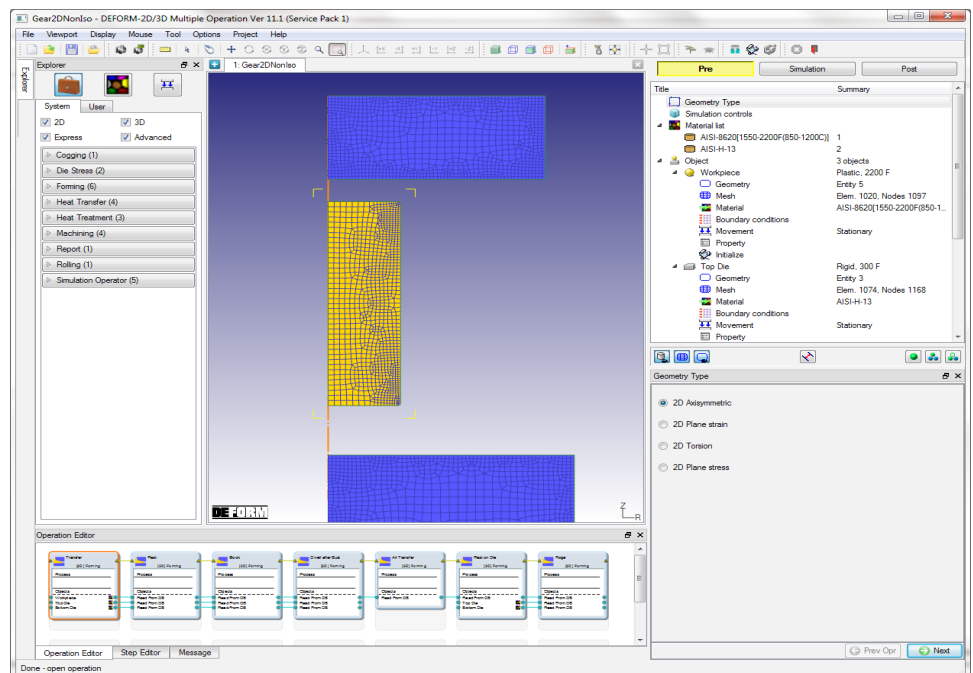
Here, the user will define the sequence of operations. For example, a project may include several forming operations with heat transfer between each.

For the initial operation, data input is essentially unchanged from earlier versions of DEFORM. For subsequent operations, preprocessing procedures that were previously interactive will now be scheduled for automatic execution.

The two major changes to information flow are the need for precise stopping control definition and the scheduling of tool positioning to an unknown workpiece shape. In many cases, scheduled positioning will take careful consideration. The user will not have the opportunity to visually verify positioning before the operation starts.

## Operation Definition

For the majority of simulations, the most used operations will be 2D or 3D Forming. These are general purpose operators, with access to forming, heat transfer, microstructure, and electrical heating. The Forming Express and Heat Transfer Express operators are used by customers with Forming Express licenses.



## Object Passing

In multi-operation processing, it is necessary to pass the results of one operation to the next. DEFORM uses a "Read from DB" object type to indicate that object data will be read from the prior operation and used as a starting point in the current operation. Object passing is shown graphically in the operation editor.

## Scheduled Positioning

In the first operation, positioning is interactive. In subsequent operations, positioning must be applied using scheduled instructions. These may involve aligning the tools to the correct layout, positioning the workpiece to the proper location within the tools and then interfering the tools to contact the workpiece.

## Stopping Controls

Because the workpiece will be passed from one operation to the next without user intervention, setting stopping controls at each operation becomes more important. To this end, an "almost filled" stopping criteria called **Contact Area Ratio** has been added for flashless closed die forming operations.

## Restarting and Rerunning

The multiple operations data structure contains two important data sets:

1) The multiple operations master file, project file, and keyword files that define the forming sequence, tool changes, and operations at run time.

These are accessed through the **Operation Editor**. Changes to the operation editor will be stored and used in future reruns.

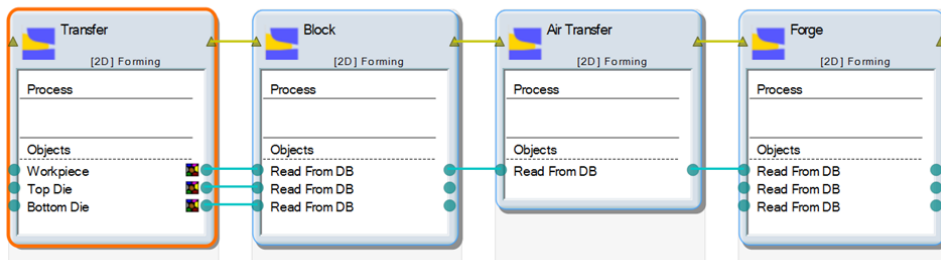
2) The database file, created at run time, which contains simulation results. This is accessed through the **Step Editor** after the model has run. Changes in the database will affect the current run, but will not be reflected in reruns, copy project, or DOE runs. The user can make changes or add steps without rerunning the full simulation. This is useful when the simulation stops prematurely.

For a design change, such as a different tool geometry or a different billet size, the current project can be copied to a new project using the **Copy Project** function. Modifications can be made to any operation. Settings that are not modified will be preserved from the first model. The model can then be run start to finish.

## Design of Experiments

Once a model runs the full process without user intervention, changing design variables is easy using the **Add DOE** function, then defining the variable ranges in the appropriate operations. DEFORM will automatically create and submit the dozens of runs necessary for a complete DOE study.

As always, the DEFORM support staff is available to help you get started with the new interface, or to answer questions along the way.



## DEFORM V11.1 Service Pack 1

DEFORM V11.1.1 is planned for release this fall. Improvements and enhancements include:

### Graphical user interface

- Operation copy/paste functions
- Multiple operation templates
- 2.5D shape rolling enhancements
- Upgraded symmetry surface handling
- Forming Express step editing
- Image and animation creation

### FEM engine

- 3D adaptive substepping
- Elastoplastic convergence improvements
- Extended large model handling
- 2D thickness-based fracture
- Wedge/pyramid element support

### License manager / batch queue

- Improved remote job robustness
- Enhanced remote database transfer
- Inverse heat transfer simulation queuing
- Large DOE stability fixes
- Command line queue submission