Summer, 2020

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DEFORM® News

Events and Training

SFTC offers DEFORM training for U.S. and Canadian customers on the following dates in 2020.

- October 13-15
- December 8-10

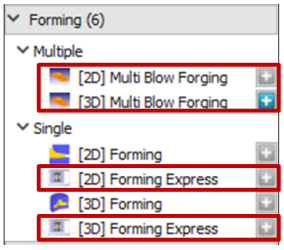
Additional training details are available on the DEFORM website.

For users outside the U.S. and Canada, please contact your local DEFORM distributor for more information on the training events available in your region.

Multi-Blow Forging

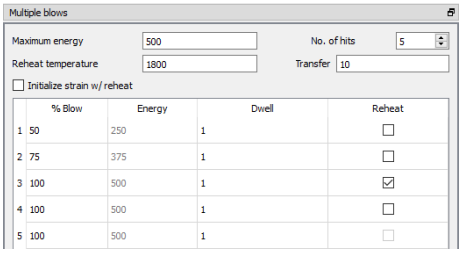
Forging on hammers poses difficulties not experienced with other forging equipment. For example, hammer dies often involve multiple cavities, with the workpiece hit several times in each cavity. The hammer energy and efficiency must be well understood in order to accurately predict the workpiece deformation for a given number of blows. Setting up scheduled positioning in the Multiple Operations (MO) environment can be challenging if there is uncertainty in how to reposition the workpiece between cavities. Finally, if the part cools quickly then a mid-process reheat may be required before continuing the forging process.

To address these type of issues, DEFORM has incorporated multi-blow capabilities into the following operations in the Operation Explorer.



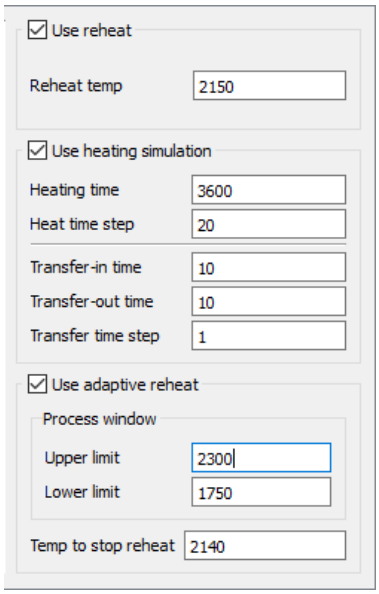
Capabilities vary slightly between the 'Forming Express' and 'Multi Blow Forging' operations.

In "Forming Express" operations, multiple blows can be specified in each cavity via a blow table, as shown in the upper right. A unique energy can be specified for each blow, if needed. Heat transfer dwells can be included between deformation blows. Users can also specify that a reheat be accounted for during the process.



"Multi Blow Forging" operations include additional functionality. The workpiece may be lifted and/or rotated after each blow. The reheat feature is also more sophisticated than that used in the Forming Express operations. It performs a full thermal analysis for the reheat instead of a simple reheat temperature reinitalization. The extra solution step provides a more accurate temperature field prediction.

An adaptive reheat feature is also available. It allows the system to automatically determine when a reheat may be required during forging. Hammer blow table reheating options are shown below.



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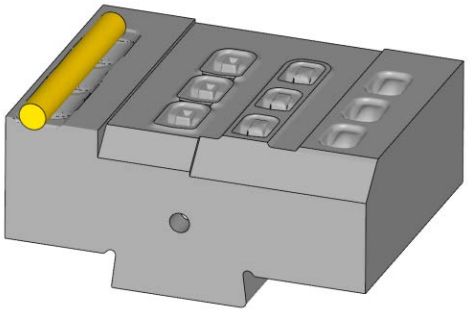
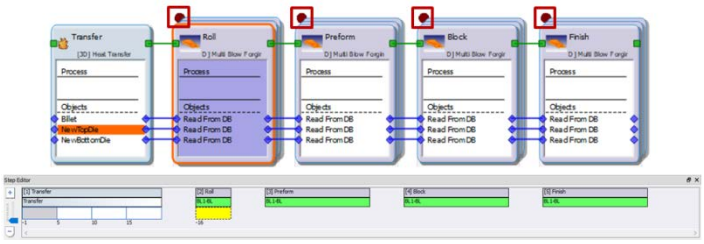
Design Environment for FORMing

The adaptive reheating option helps users answer common temperature-related questions. Does the part chill too much during the process? Does it need to be reheated? At what point does it need to be reheated? If a reheat is required, how long does the part needs to be heated before it reaches the desired temperature?

The image at right shows a hammer forging die set where the workpiece must be moved from one cavity to the next by hand. The complex shape and manual positioning make it difficult to predefine cavity-to-cavity positioning instructions at the start of the process. The user might want the workpiece to be batch controlled as a 'Read from DB' object and interactively positionable in each cavity. This was not easily accomplished until the concept of a Breakpoint was added to the Multiple Operations environment.



Breakpoints may be added to operations where manual interactive positioning of the billet is desired. The feature can be found by right-clicking an operation tile in the operation editor, as shown below. Using the feature, the entire operation sequence can be predefined but scheduled workpiece positioning can be temporarily ignored.



The simulation will run until the breakpoint is encountered, at which time the first step of the breakpoint operation is written to the database. Users can then open that step in the Step Editor, manually position the workpiece, generate contact, write the database and continue the simulation. Breakpoints make the modeling of complex hammer forging processes much easier.

Hammer characterization is often needed to accurately model hammer forging. It involves determining a hammer's input energy and its efficiency as a function of forming load. During initial blows, forces are usually low so most energy goes to deforming the workpiece (high efficiency). By the finisher operation, forces are quite high and the efficiency is much lower. This variable efficiency may be quantified by defining a hammer stiffness (see the Spring 2012 DEFORM News for additional details).

The forging process should be modeled as accurately as possible when determining a hammer's stiffness. Simulating transfers and dwells between blows will yield realistic temperatures and thus more accurate forming loads. Any complimentary alignment between real-world conditions and simulation assumptions will improve the accuracy of the stiffness calculation. Well-characterized hammer energy and stiffness specs are intended to be reusable in simulations of other jobs on the hammer.

Releases

DEFORM V12.0.2 was released in July and is available for download from the DEFORM User Area. It includes the following changes:

General

- Improved reference object handling for die distance stopping
- Display of simulation summary at database generation
- Simulation monitoring display of "percent complete" based on stroke or die distance
- Interference positioning by first encountered object
- Partial revolve option for brick mesh generation
- Improved picking behavior for multiple boundary selection
- Enhanced measurement display options
- Better DEFORM Viewer stability and performance
- Improved 3D gas trapping in symmetry simulations
- More robust 2D and 3D meshing behavior

Shape Rolling

- Independent simulation controls for rolling and heat transfer
- 2.5D rolling batch queue support

Extrusion

- Improved bearing control point picking

Ring Rolling

- Automatic ring center updating in batch mode setup

Spinning

- Improved preview page loading performance
- Pass Table thermal enhancements

The complete list of improvements can be found in the V12.0.2 Release Notes. Release notes are included in the DEFORM installation and are also available on the DEFORM User Area.

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