

DEFORM News

Training

SFTC will offer DEFORM training for U.S. and Canadian customers on the following dates in 2025:

- June 10-12
- August 12-14

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

Forge Fair 2025 will take place on May 13-15, 2025 at the Huntington Convention Center in Cleveland, OH. We welcome you to visit with SFTC staff in Booth #335. A presentation highlighting recent developments in DEFORM will be given on Wednesday, May 14 at 2:10 pm in Track C.

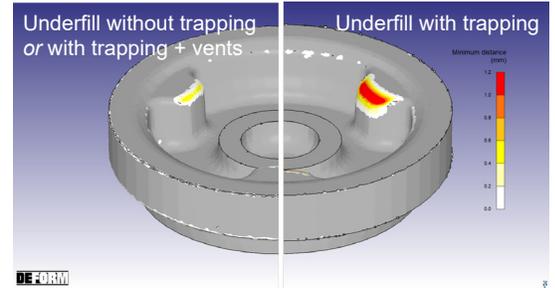
The Spring 2025 DEFORM User Group Meeting (UGM) will be held in Naples, FL on May 19-20. UGM presentations allow companies to stay up to date on recent and future DEFORM developments. It will also include educational workshops on best practices for key modeling topics. Details and registration for the event are available on the DEFORM website.



Design Environment for FORMing

Gas/Lube Trapping & Vent Channels

In closed-die cold forming and hot forging, underfill and nonfill are terms used to describe a defect where deformed material fails to properly fill die cavity features. Die fill issues can lead to dimensional deficiencies, insufficient machining coverage or undesirable surface features.

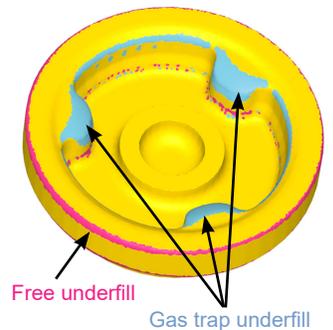


Certain fill issues are caused by gas or lubricant entrapment. Gas or lube may become trapped, in die pockets and corners, as contact between a workpiece and die evolves. The closed volume of gas or lube compresses as the die fills, which increases pressure on the workpiece and die surfaces. Once high enough, the pressure generated by the compressible gas or less-compressible lubricant will prevent material from completely flowing into critical die features.

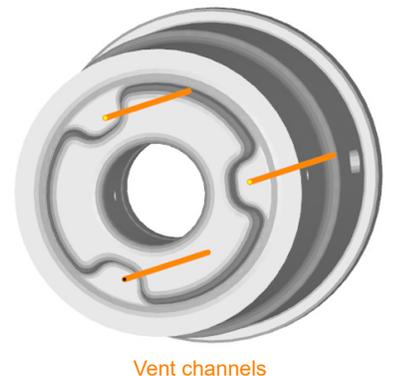
Die fill issues related to gas/lube trapping can be addressed by redesigning the preform and/or die geometries to reduce the extent of trapping. Another solution is to provide a means for the gas/lube to escape by placing vent channels or breaks between tools in the troublesome area.

The optional gas/lube trapping feature in DEFORM has recently received a number of enhancements. For example, in DEFORM V14.1, the feature will be activated from the process conditions section of the simulation controls menu. The menu lets the user choose gas or lube trapping and includes a built-in list of lubricant compressibility properties.

The DEFORM V14.0.2 postprocessor includes new contact display options for die fill and underfill. The “Show underfill” has been enhanced to display “free” and “trapped” underfill regions in different colors (light blue and pink, respectively). This information helps designers to determine where it might be useful to add venting to a die.



DEFORM V14.1 will also introduce a user-requested capability to define vents on a die during simulation setup. The vent definitions will be handled entirely within DEFORM, so vent holes do not need to be added to the CAD model for simulation purposes. A table of venting channels can be created and managed through the new gas trap section of the object property menu. This feature will provide users with an easy and efficient way to test vent hole placement.



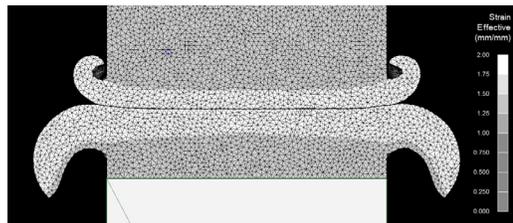
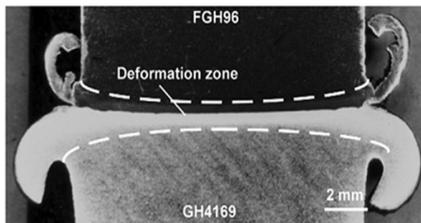
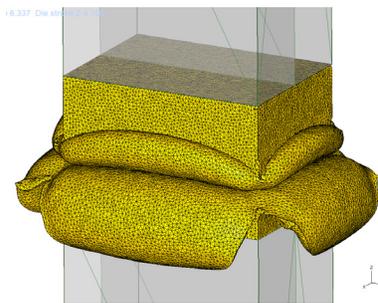
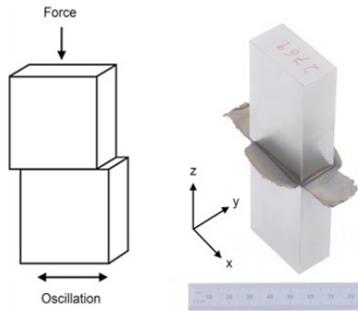
Linear Friction Welding (LFW)

Linear friction welding (LFW) is a solid state welding process where two objects are joined by frictional heat generated via linear oscillation at a contact interface under applied load. Process parameters of interest include the oscillation frequency, oscillation amplitude, applied pressure and material consumption rate.

Ref. (right): McAndrew AR., "Modelling of Ti-6Al-4V linear friction welds", Thesis. Cranfield University; 2015.

DEFORM V14.0.2 introduced an advanced 3D arbitrary Lagrangian Eulerian (ALE) modeling capability to predict deformation, heating, flash and residual stresses in LFW processes. Numerous system enhancements facilitated a substantial reduction in solution time, as compared to traditional solution methods. Advanced 3D LFW models, like those shown here, can be completed in only a few hours on desktop computer hardware.

3D ALE LFW development and modeling details are available in the Fall 2024 DEFORM UGM presentation. A summary of DEFORM solid-state welding applications, including friction stir welding (FSW) and rotary friction welding (RFW) is given in the Winter 2019 DEFORM News newsletter.



Ref.: P. Geng, G. Qin, T. Li, J. Zhou, "A Computational Modeling of Fully Friction Contact-interaction in Linear Friction Welding of Ni-based Superalloys", *Material & Design* 185 (2020).

DEFORM-API for Python

DEFORM-API, introduced in DEFORM V14.0, is an application programming interface (API) integrating DEFORM with the open-source Python ecosystem. Python is a text-based, general-purpose programming language, popular for its ease of use, power and versatility. DEFORM-API makes the extensive features and capabilities of DEFORM readily accessible in Python projects. This exciting development is purpose-built for next-generation optimization, digital twin, automation, machine learning and artificial intelligence (AI) efforts.

The API has been well established in recent DEFORM releases, opening the majority of core functions to the Python environment. The functions available through the API continue to expand. Tools and information related to the DEFORM-API are provided in the DEFORM installation directory.

Potential uses for the API are only limited by imagination. Link DEFORM with CAD systems to automate the generation of simulation-ready geometries and meshes. Integrate DEFORM with commercial, open-source and proprietary software. Base model settings on empirical equations or experimental data. Develop post-processing variables tailored to specific analysis requirements or industry standards. Automatically extract standardized data sets from simulation results, facilitating in-depth analysis and decision-making.

DEFORM V14.0.2 Release

DEFORM V14.0 Service Pack 2 (V14.0.2) is available for Windows and Linux. It includes enhancements based on customer requests and addresses bug fixes identified from feedback on prior versions. Enhancements include:

- ALE linear friction welding (LFW)
- Tube piercing enhancements
- Cogging pass table import/export
- Measurement Tool label editing
- Enhanced "Show dimensions"
- Gas/lube trap under-fill display
- "Metal flow" report option
- Color bar layout adjustment
- 3D model export for PowerPoint
- Load-stroke summation plot
- Load-stroke superimpose plot
- License expiration warning pop-up
- Start Menu shortcut editor
- Multi-ram press model enhancement
- DEFORM API update
- V14.1 "Beta" mesher availability
- Intel CPU optimization
- Parallel remesh backup meshing*
- Stability improvements*
- Shape rolling flowline tracking*

*Linux specific developments

Full details on the new release are available in the V14.0.2 Release Notes. The release notes also summarize developments introduced in the earlier DEFORM V14.0 release.

DEFORM V14.1 is targeted for release in Spring/Summer 2025. More information will be provided to active DEFORM users upon release.