MSC.SuperForm can be used to:

- Accurately predict the material flow
- Determine if Laps or other defects exist
- Determine the stresses in the tools
- Determine the stresses, temperatures, and plastic strain in the work piece.
- Determine the forming force
- Evaluate tool fatigue
- Help determine the optimal shape of the preform.
- Simulate the influence of material selection
- Simulate the influence of lubrication
- Predict damage and failure
- Predict grain size
- Predict springback and residual stresses
- Simulate different forming presses
- Simulate trimming operation

MSC.SuperForm 2003 provides solutions to manufacturing problems including hot and cold (open or closed) forging, extrusion, rolling, blanking, cogging, cladding, thick sheet bending, riveting, spin forming, orbital forming, cutting, and die stress analysis. MSC.SuperForm uses the finite element method with a wealth of material and process models to support tool designers and engineers. An intuitive graphical user interface navigates the engineer through the manufacturing simulation.

MSC.SuperForm is an integrated product for planar, axisymmetric and three-dimensional problems. The same program is consistently used for all problems.

Tool and workpiece geometry may be built in either 2-D or 3-D. Tool and workpiece geometry and mesh can be imported from CAD or other FEM software systems using:

- IGES
- AutoCad
- VDAFS
- STL
- ACIS
- SDRC
- MSC.Nastran™/Patran™

The tools can be rigid, load or spring controlled, elastic or even elastic-plastic. This allows one to use pre-stressed dies in the simulation.

- Reduce Time-to-Market
- Reduce Cost of Tool Development
- Reduce Production Costs
- Improve Product Quality
MULTI-STAGES
MSC.SuperForm can transfer results from one forming stage to another. This includes simulation from an axisymmetric analysis in one stage to the full three-dimensional simulations in another.

The material models include large strain capabilities and the following characteristics:

- Elastic-plastic
- Visco-plastic
- Temperature dependent
- Isotropic Hardening
- Power Law Hardening
- Johnson-Cook Model

Damage such as central burst may be predicted using one of the following damage models:

- Cockcroft-Latham
- LeMaitre

Metallurgical simulation incorporating material phase changes is also possible. The evolution of material characteristics including grain size can be simulated using either the Yada model or a user-defined model.

TOOL KINEMATICS
MSC.SuperForm supports a wide range of press types to define the process kinematics including:

- Crank
- Eccentric
- General
- Hydraulic
- Hammer

Simulation of a cogging operation.
LUBRICATION SIMULATION
MSC.SuperForm provides a database of the effective friction coefficient for typical processes. Both a shear based friction model and a Coulomb based model are available. Heat generated due to friction is incorporated into the model.

VISUALIZATION OF RESULTS
MSC.SuperForm quickly allows users to visualize the simulation, even while it is being performed. This includes:
- Flowline and Particle Tracking - to observe the material flow
- Contour plots of all quantities
- Load deflection plots
- Vector and symbol plots
- Numerical displays
- 3-D cutting planes
- Time History Plots
- Animation, AVI and JPEG files

Simulation of a self-riveting process.

Die Stress Analysis

INTEROPERABILITY
The results can be easily transferred to MSC.Marc™ or MSC.Fatigue™ for structural simulation based upon the manufactured geometry and residual stresses. All analyses from Buckling Simulations to Vibration, to fatigue life can be performed. The integration with MSC.SuperForge™ also allows data transfer between the two products.

TECHNOLOGY
MSC.SuperForm is built on a foundation of over 30 years of nonlinear analysis using MSC.Marc. The technology allows either mechanical or coupled thermal-mechanical simulations. During the manufacturing, because of large material deformation the finite element mesh is automatically remeshed. This insures an accurate solution, and is available using:
- Quadrilateral elements for 2-D simulation
- Enhanced triangular elements for 2-D simulation
- Hexahedral elements for 3-D simulation
- Enhanced tetrahedral elements for 3-D simulation

MSC.Software provides the industry's most comprehensive support system with over 50 offices worldwide to provide local and centralized support. Investing in MSC.Software gives you access to extensive client support through comprehensive documentation, direct technical expertise, and customized training classes.

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