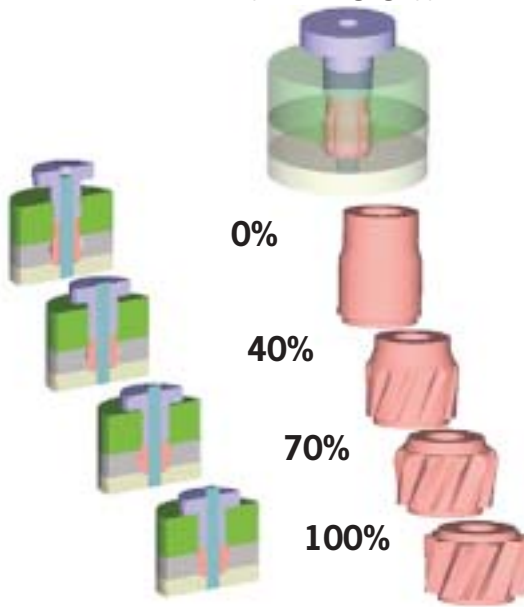


Providing Unparalleled Accuracy and Speed in Forging Simulations

OVERVIEW

MSC.SuperForge 2003 is an industrially proven software package for the computer simulation of industrial forging processes. It combines a familiar and intuitive Windows® graphical user interface with a robust solution procedure to provide unprecedented accuracy and speed in forging simulations.

MSC.SuperForge is the first "meshless" forging simulation tool available on the market, and is utilized by leading forging companies and suppliers around the world to successfully simulate the forging of a wide variety of practical industrial parts. To expand the simulation capabilities, MSC.SuperForge 2003 also includes a world class 2-D & 3-D finite element solver tailored for specific forging applications.



Hot forging of a titanium helical gear.

BENEFITS

Forging simulation offers significant cost and time advantages by providing detailed insight into the forging process before tool selection and process decisions are made on the shop floor. Process data such as material flow, stresses, strains, and temperature are readily accessible to a user at any point throughout the simulation process, as well as at any location within the forged part. Potential defects such as laps and under-fill of die cavities can be easily identified and corrected before part production begins. In addition, the influence of process conditions, such as lubrication and pre-form can easily be quantified and assessed.

✓ Enhancement in 2003

PRODUCT FAMILY

MSC.visualNastran™ desktop

CAPABILITIES

User Interface

- Windows Native 'Look and Feel' with OpenGL support
- English, German and Japanese Graphical User Interface
- Single user interface for model preparation, job submission and results visualization
- Drag and Drop model creation
- Parameter study access by simple right- mouse click
- Simple definition of multi-stage processes by 'Copy and Paste'
- Interactive window picking for distance measuring and variables query
- Online help with "Getting Started", modeling guidelines and index search
- ✓ Automatic job queuing for multiple simulations
- ✓ Live Update to allow easy download for new upgrades and enhancements

Simulation Model Management

- ✓ 2-D and 3-D simulation
- ✓ Most advanced finite volume and finite element technologies
- ✓ Advanced tet-meshing for FE solver
- Direct import of CAD geometry (STL)
- Export to STL or Nastran BDF format for re-use in CAD
- Accurate description of work piece surface and the material flow by RET ('Resolution Enhancement Technology')
- Automatic or manual positioning of work piece and tools
- Positioning of work piece into tool with sliding
- Work piece and tools can be transparently represented
- Work piece can be re-heated between forging stages
- Selection of different friction models and conditions
- Automatic multi-blow screw press and hammer
- New particle definition for plane, centerline and edges

Database

- Popular US, German and Japanese materials database with temperature and rate-dependent material parameters
- Press, material, lubrication and heat transfer can easily be stored in company-specific databases for future reference
- Pre-defined press types (crank press, hydraulic press, hammer, rolling mill and user- defined speed) with easy definition of press values

Results & Visualization

- Tool under fill
- Contact pressure on the tool
- Internal tool Stress and temperatures
- Creation of JPG images and AVI animations
- Parallel solver support
- Contour and vector representations as well as time histories (e.g. force-stroke curve)
- Results visualization on easily defined cutting planes
- Conduction, convection and radiation capability between work piece, tools, ambient
- Computation of calorific losses to the environment
- Die wear and damage prediction
- Material particle tracking
- Continuous detection and color highlighting of folds, air and lubricant pockets throughout forging process

Simulation of the forging process with MSC.SuperForge protects your competitive position by reducing:

- Number of prototype die designs
- Number of defects
- Scrap and material waste
- Number of physical prototypes
- Shop floor trials
- Product development time
- Reject rates in mass production

While simultaneously increasing:

- Die life
- Product quality
- Lead time for the development
- Reliability in delivering products on time
- Flexibility in customer response
- Process know-how
- Competitive advantage

ACCURATE TECHNOLOGY

MSC.SuperForge represents an industrially proven software package specifically designed for 2-D and 3-D simulation of forging operations by utilizing Finite Volume and Finite Element technologies. Finite Volume technology is both fast and accurate since flow calculations are performed on an undeformed finite volume mesh and it is robust since remeshing techniques are completely eliminated. On the other hand, the Finite Element solver in MSC.SuperForge 2003 will offer 2D and 3D simulations with automatic re-meshing techniques for a wide variety of applications that are well suited and more practical for an FE solver to predict such as the behavior of pre-form operations like bending and upsetting or to compute the die stresses.

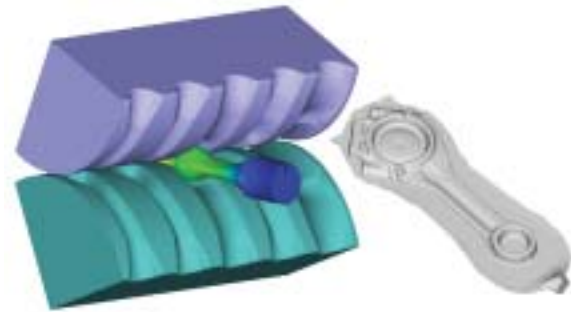
The solution's robustness and speed make MSC.SuperForge an ideal tool for forging simulations in which high resolution of material flow details is desired with reasonable CPU processing time.

MSC.SuperForge supports shared memory parallel (SMP) on multiple processors to reduce the CPU time. In addition, the meshing of complex tool and work piece geometry, a tedious and time-consuming operation, is completely eliminated.

After importing the CAD data, the user can simply select the process parameters from databases (materials, press characteristics, friction values, etc.) and proceed with the simulation. This new technology is proven in practice by leading forging manufacturers throughout the world.

ANALYSIS RUN

MSC.SuperForge is specially designed for industrial forging applications, and its Windows look and feel allows design engineers to quickly and easily define forging simulation models.



Forming of a connecting rod

Experience in the forging field has demonstrated that design engineers can successfully work with MSC.SuperForge. Training typically consists of 1 day instead of the 1 week, which is common for competitive tools. A complete presentation of the forging process can be defined in minutes, including:

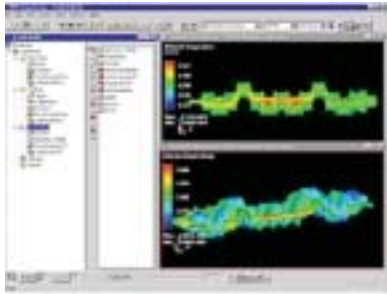
- Import of CAD geometry via STL, DXF, Nastran, or VRML format
- Selection of the used press from the press database, selection of the work piece and tool material from the materials database
- Definition of friction conditions, definition of the temperatures and heat transfer coefficients for work piece and tools
- Positioning of work piece
- Start of analysis



Enhanced workpiece positioning (Courtesy: Precision Components Intl.)

MSC.SuperForge has powerful results visualization capability which provides forging process engineers with detailed insight into the forging process, including:

- Material Flow
- Die fill
- Flash regions
- Die wear and damage prediction
- Die loads and stresses
- Particle tracking
- Fold and Lubepocket highlighting



Windows native "look& feel" GUI



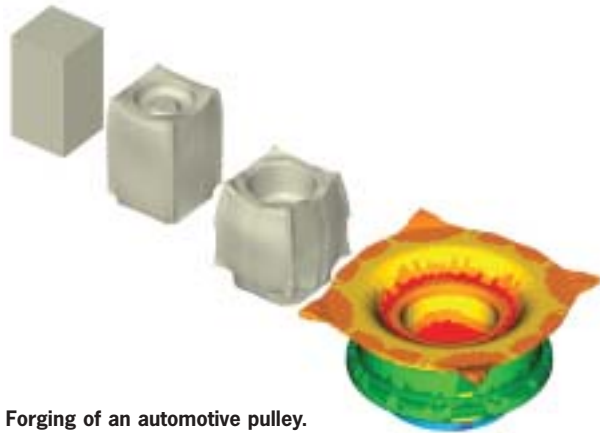
Forging of a crank shaft.

PRE-Release Features

- Die-wear prediction
- Damage Model
- Interface to MatILDA for material database and grain size predictions
- Updated Hensel Spittel Material

System Requirements

Windows NT, 2000



Forging of an automotive pulley.

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SIMULATING REALITY