



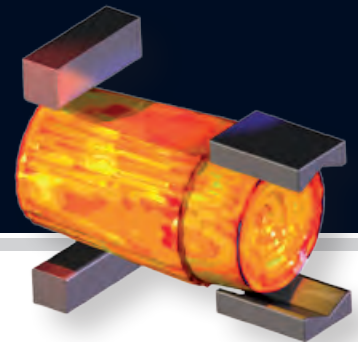
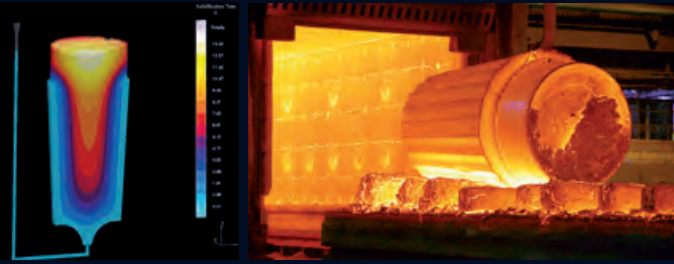
# simufact.forming

## Open Die Forging and Radial Forging

**Open Die Forging - the ultimate option for custom-designed metal components**

*Open Die Forging is a flexible production methodology allowing homogeneous high-strength, long-life components optimized in terms of both mechanical properties and structural integrity. It enables the manufacturing of individual and small series parts. The open die forging process is considered the ultimate option in custom-designed metal parts.*

by courtesy of



## simufact.forming Open Die Forging and Radial Forging

### No. 1 in Open Die Forging Simulation

**Simufact provides the most precise results due to realistic process representation. Leading machine manufacturers and many customers rely on Simufact simulation technology.**

#### Take Advantage of the Benefits:

- Shorter development times
- Deeper process understanding
- Higher process stability & quality
- Prediction of component properties
- Higher machine uptime
- Substantially reduced development times
- Broadening of the product range
- Optimal coordination of the individual process steps
- Reduction of cracks and scrap
- Less heats

#### Reach your Optimisation Goals with Simufact.forming

- Avoid forging defects
- Analyze the force and energy requirements
- Maintain the required temperature ranges
- Prediction and avoiding of blowholes
- Meet final geometry requirements
- Achieve microstructure requirements
- Determine the required forging strategy
- Optimization of pass schedule



MSC Software Company

# simufact.forming

## Open Die Forging and Radial Forging

### Fields of Application

#### Materials and Grades

- Carbon steels
- Low and high alloyed steels
- Austenitic steels
- Super alloys like Inconel, Hastelloy, Waspaloy, Incoloy, Nimonic
- Non-ferrous metals like Titanium, Aluminium and copper alloys

#### Entire Process Chains

Simufact.forming models the entire manufacturing process chain of open die manufacturing, eventually starting with results from a foregoing casting simulation, the initial heating, forging of pre-shapes, piercing, open die forging, machining of the final geometry, the heat treatment as well as subsequent joining, e. g. welding, of forged parts.

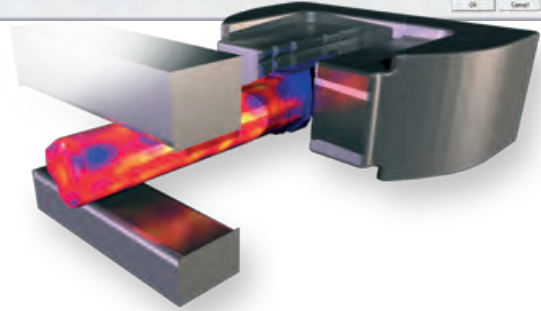
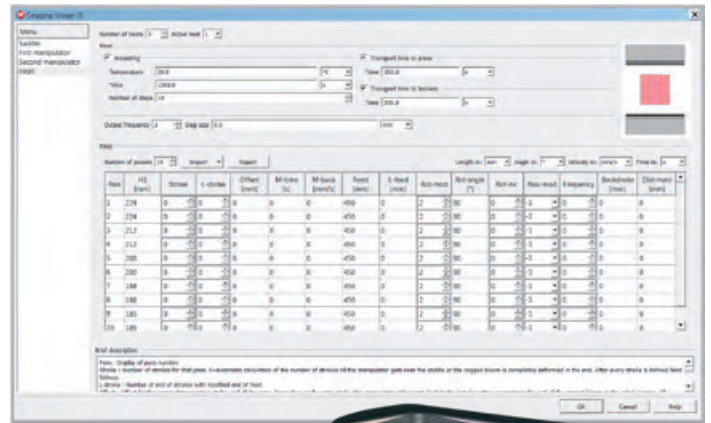
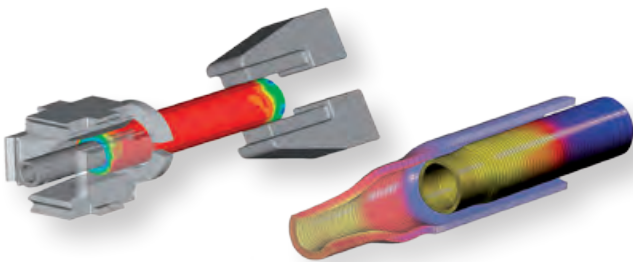
#### Wide Range of Open Die Forging Processes

No matter if cogging, radial forging or shell forging (drawing or enlarging): With Simufact.forming all open die forging processes can be simulated in all dimensions and for all varieties of forged products.

#### Boundary Conditions for Open Die Forging

In order to provide you with a realistic representation of open die forging processes, Simufact.forming is considering the typical boundary conditions of those applications:

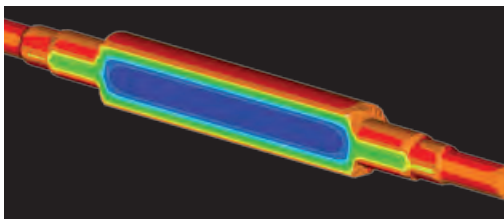
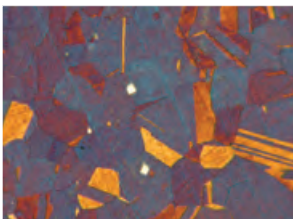
- Arbitrary numbers of tools and different kind of tool movement
- Spring controlled manipulators
- Automatic handling of several manipulators with handing over of work piece (automated clamping and releasing)
- With and without mandrel
- Work piece movement in any order – arbitrary rotation angles and directions, drawing and pushing
- Multiple heats in one simulation run
- Intelligent control on the kinematics based on the results of every single blow
- Open kinematics concept for individual customizing purpose



### Our Simulation Know-how – Your Advantage

Tap into our years of expertise in the simulation of metal forming processes as well as the high technical and functional level of our software products:

- Consequent application of hexahedral elements provides more precise results
- Special mesh generation algorithms and strategies for open die forging applications
- Through-process application of elasto-plastic as well as thermo-mechanical coupling in the material model
- This results in a highly accurate description of the stress-strain condition
- Models for the microstructure kinetic
- Simplest use due to templates and libraries providing close to production parameter definitions
- Precise modelling of the tribology by innovative friction models
- Realistic representation of the contact including of slip effects
- Realistic process modelling with „rigid-body-modes“ – allowing for the realistic work piece movement
- The process model can be arbitrarily complex in respect to the number of tools, kinematic degrees of freedom and boundary conditions – still maintaining user-friendliness
- Representation of the complex kinematic control allows simulation progress depending on achieved process results
- Fast 3D simulations due to innovative Parallel Computing on Multi Core Workstations and Cluster Systems



MSC Software Company

Tell us your specific application; we will be happy to advise you.