

Stress Analysis of Cold-Forming Tooling via FEM

Graduate



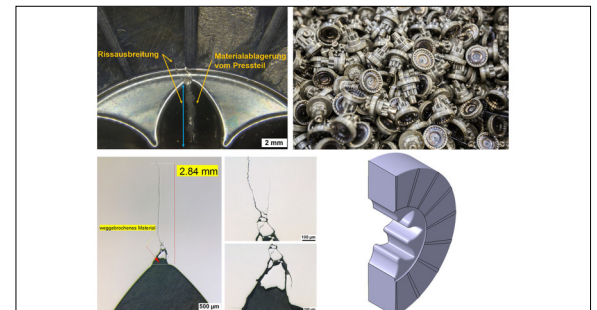
Domenik Graf

Initial Situation: SFS Group AG manufactures precision formed parts for a wide range of applications using cold forming technology. For the design of the cold forming process, the interaction between the forming of the workpiece, tool design and machine sequences must be accounted for. SFS uses finite element methods for the design and optimization of the forming process. The tool design is based on internal standards and experience. In case of tool life problems, the tool design is optimized through trial and error.

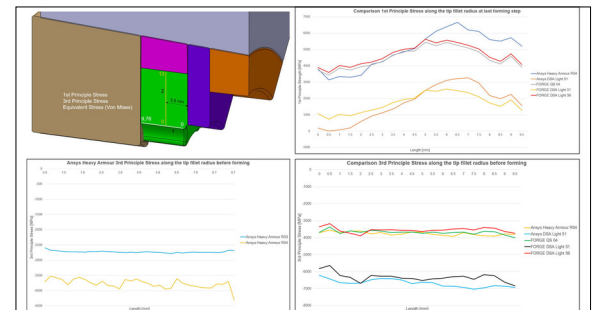
Definition of Task: The goal of the present work is to exploit the possibilities of the finite element methods to a greater extent by transferring the process loading of the forming simulation to its tools. In this manner with the help of a further simulation, the tool design can be optimized. SFS is pursuing the long-term goal of identifying tool life problems in advance and optimizing the tool design in the development phase. To achieve this goal, experience must be gained, which is achieved by comparing theory and practice. The simulations are executed with the programs Ansys and FORGE and the results are compared with each other.

Approach: In order to gain experience, a simulation model of a current production part is constructed and the damage patterns are compared. The damage analysis is needed to verify the simulation results. With the help of a parameter study, the relevant stress values are evaluated and compared with each other. In addition, it is examined to what extent the model setup of the simulation can be simplified in order to make future simulations more efficient.

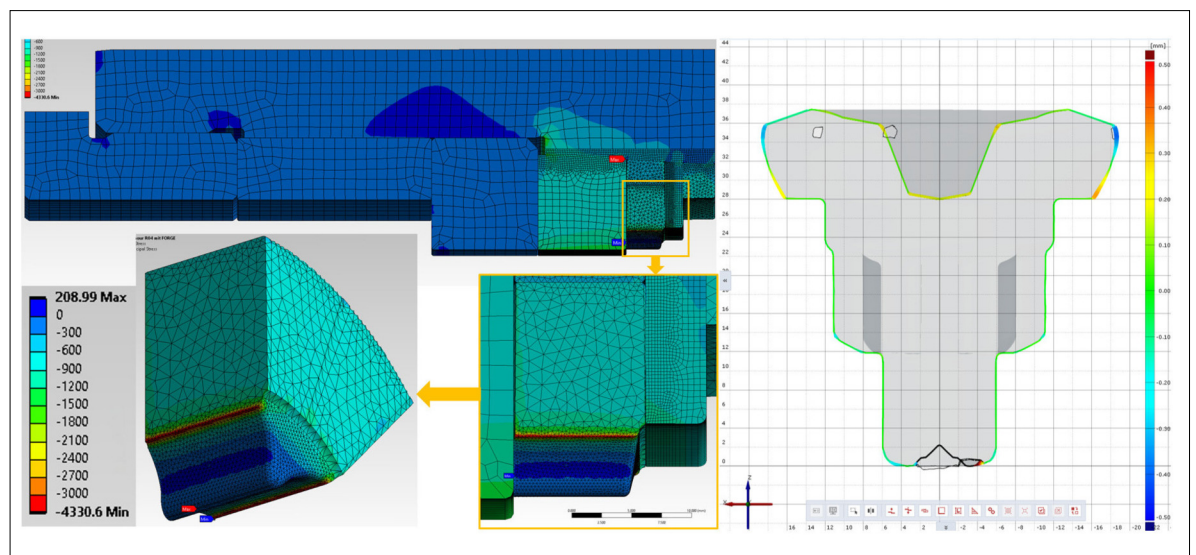
Damage analysis of cold forming tools SFS Group AG



Stress analysis of different simulations on the cold forming tool Own presentation



Analysis of tensile stresses on the cold forming tool (left) Dimension comparison simulation - measurement (right) Own presentation



Advisor
Stefan Uhlar

Co-Examiner
Dr. Marco Lüchinger

Subject Area
Mechanical
Engineering

Project Partner
SFS Group AG,
Heerbrugg, St. Gallen