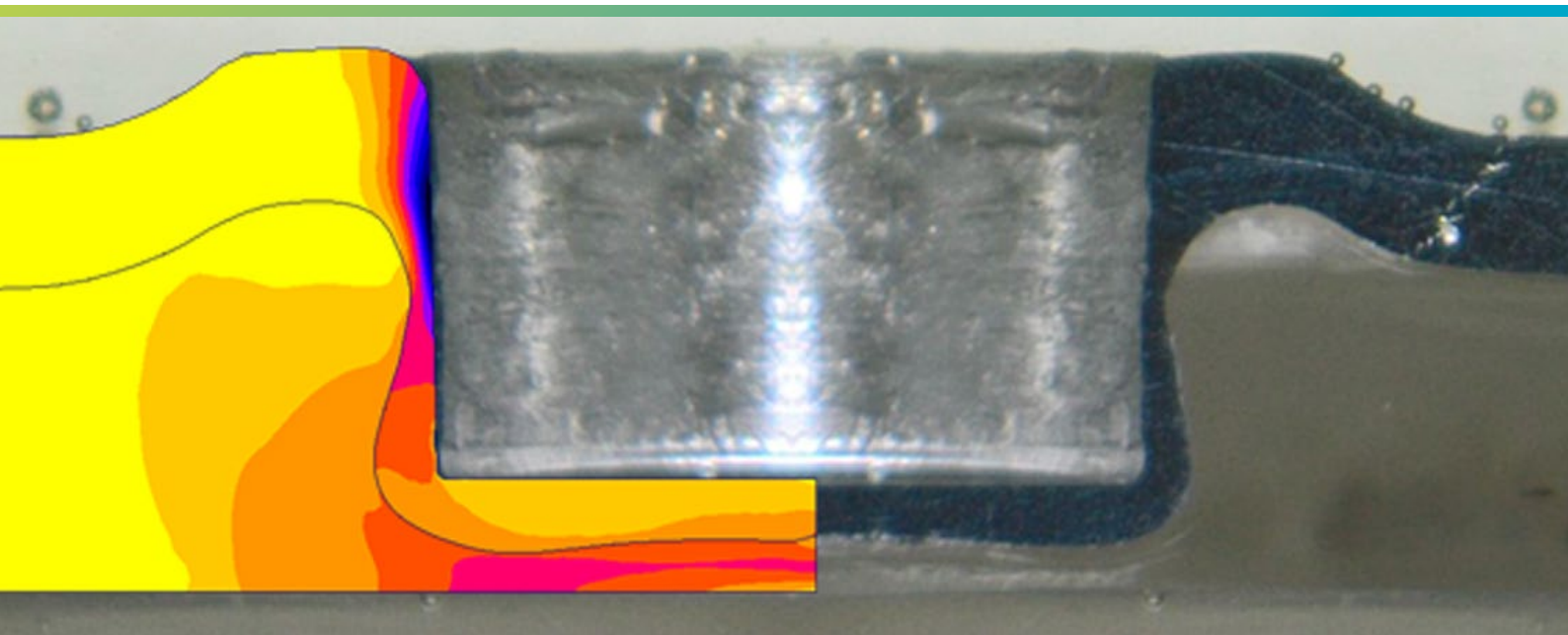


Innovative joining process developed with Simufact.forming

Joining specialist Eckold realizes flat-clinch technology based on FE simulation



Objectives

Using Simufactforming for process simulation the joining specialist Eckold GmbH & Co. KG and the Chair of Virtual Production Engineering, Chemnitz University of Technology, developed an innovative flat-clinch technology.

The aim of the development project was to produce a form of connection that joins organic and/or inorganic material mechanically in a single-staged process to a mechanical compound with a plane surface on the die side.

Challenge:

Development of a clinch connection with a plane surface on the die side

Solution:

Systematic process development using numerical simulations

Used products:

Simufact Forming

Customer:

Eckold GmbH & Co. KG

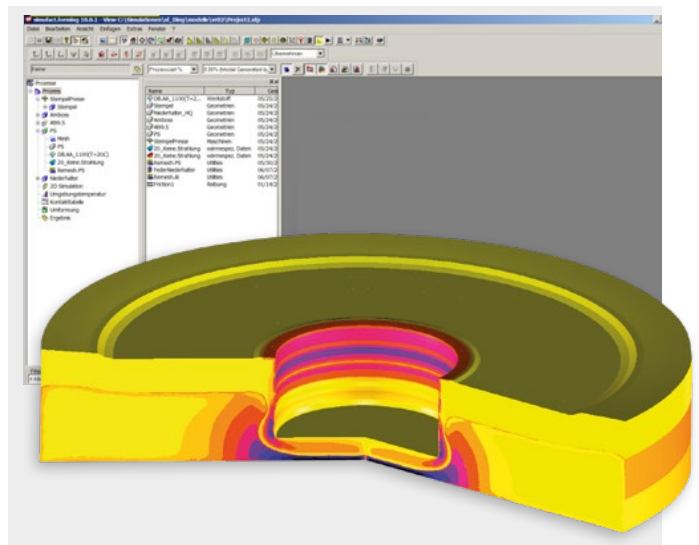
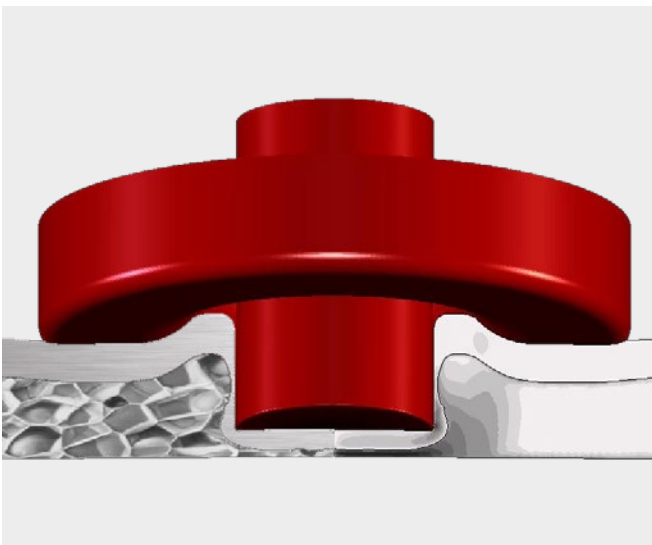


Simulation

The development of the flat-clinch-process is primarily based on the finite element method. In a first step, it was necessary to determine the particular flow properties of the test materials. Having deposited this information and modeled each tool and processing step, targeted simulation calculation and numerical material flow analyses were realizable. Based on this, the multifactorial relations of relevant factors were analyzed to derive procedural principles.

Results

The newly acquired insights were used for numerical shape optimization of tool components. The individual tool components were integrated into the machinery concept and implemented in the universal C-shaped stand machine DFG 500/150E of Eckold GmbH & Co. KG, which was specifically adapted for the flat-clinch technology. The experimental validation of the numerical results proved that metal components, metal and synthetic components as well as synthetic and cardboard components can be clinched flatly.





Using flat-clinch joint we were able to develop a stabile form- and force closure connection with one-sided flatness that is deployable in the viewable area or as functional surface. For us this has opened up new fields of application in mechanical joining technology. This process is also suitable for joining dissimilar materials, e.g. synthetics with metal. Therefore is flat clinching an excellent opportunity to ensure multi-material design with a short and effective process chain and to further intensify intelligent lightweight engineering with its trend towards material-mix.”



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