

## Through-process model for the microstructure of dual-phase steel



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**(Prof. Maudie Ziemann)**

## THROUGH-PROCESS MODEL FOR THE MICROSTRUCTURE OF DUAL-PHASE STEEL

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Shaker Verlag Aug 2011, 2011. Taschenbuch. Book Condition: Neu. 208x146x12 mm. Neuware - Due to the fact that small variations in chemical composition and industrial process parameters are known to have a strong influence on strength and formability of dual-phase steels, precise control of the microstructure evolution during full processing route is required for achievement of defined mechanical properties. Nowadays it is reasonable to apply physical based numerical investigation approaches, which has reached a level where a property-driven improvement of the microstructure becomes possible. The current work is focused on a through-process model for the microstructure evolution during processing of dual-phase steels from cold-rolled strips, which allows coupling to available RVE-FEM approach for the prediction of mechanical properties within a continuum mechanical framework. In order to understand the relevant features of the transformations occurring during intercritical annealing, all metallurgical processes on the microstructural scale, i.e. recrystallisation, austenite formation and decomposition were separately investigated before being combined into one integrative process model. 2D- and 3D-modelling of the microstructure evolution is realised by means of Multi-Component-Multi-Phase-Field method using the commercial software MICRESS®. It was shown that both 2D- and 3D-Phase-Field approaches enable the simulation of the microstructure evolution during whole processing of dual-phase steels by accurate definition of the input model parameters. Subsequent coupling with the RVE-FEM approach by means of commercial software ABAQUS® allows the prediction of flow behaviour which offers a correlation between process conditions and final mechanical properties. The basic model development is realized on a cold-rolled strip with ferrite-plus-pearlite microstructure in delivered stage and DP600 composition along a selected heat treatment with defined process parameters according to industrial production. Finally, the extension of the model to general process parameters and the application to the industrial conditions is realised in order to show the potential of the approach developed...

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