



The ICAMS Seminar presents

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Wöhlerstr. 11  
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ICAMS Seminar room UHW 11/1102

## **Application of crystal plasticity and phenomenological models for the representation of steel materials in industrial processes**

The production chain of components made of steel materials is very complex, because different thermomechanical properties are utilized during casting, hot and cold rolling, heat treatment, as well as deep drawing, stamping, and welding. For this reason, the precise modelling of such process chains is a challenge and requires an appropriate choice of the applied simulation model for each process step. In certain parts of the process chain like cold rolling, crystal plasticity modelling concepts seem to be appropriate for the precise representation of the material behaviour including the texture evolution. Unfortunately, large computation times are required, which lead to the situation that not all parts of the process chain can be effectively represented by computational crystal plasticity. Thus, a useful combination between crystal plasticity based approaches and macroscopic modelling strategies seem to be a very promising way for the adequate representation of complex process chains. The lecture focuses on the process chain of dual phase steels by means of cold rolling, heat treatment, and deep drawing. In the first part of the lecture, the modelling concepts in the framework of continuum mechanics are discussed. Thereafter, the modelling approach for the process chain of a dual phase steel is shown.