MM 3: Topical Session Designing Innovative Structural Materials and Steels I

Time: Monday 10:15–11:15 Location: H4

Topical Talk MM 3.1 Mon 10:15 H4

Materials design for new cold formable steels — •Wolfgang Bleck — Department of Ferrous Metallurgy, RWTH Aachen University, Intzestr. 1, 52072 Aachen

Optimising the balance of strength and formability is one of the major topics in current sheet steel development. In addition to the empirical approaches new design methods based on computational engineering have been developed and are currently being applied. Different modelling options are being discussed with respect to their prediction capability, their quantitative accuracy and their limitations. Examples are provided focusing on the recent development of car body steels.

Topical Talk MM 3.2 Mon 10:45 H4

The long way from "atom to auto": Materials Simulation today — •Ingo Steinbach — Stiepelerstrasse 129 44801 Bochum

The possibility to build a material from its constituents, the atomic cores and electrons, on a computer at finite temperatures inspires the imagination of materials scientists from academic research as well as from industry. In a hierarchical approach information from the electronic and atomistic scale can be transformed to defect structures on a mesoscopic scale, the knowledge of which is crucial for advanced materials descriptions on the macroscopic scale. An alternative approach, and even more ambitious, is the concurrent multiscale method which aims on representing multiple scales in one calculation. A well known application is propagation of a crack tip where the mechanical load on a work piece is transferred by seamless combinations of materials models down to the atomic bonds. The reason to formulate these hierarchies and combinations of models is obviously the impossibility to represent the whole work piece by atoms in today's (and tomorrow's) computers. The talk will review the state of the art of modern multiscale materials simulation and highlights new developments from the author's own research.