

8th International Conference on Physical and Numerical Simulation of Materials Processing (ICPNS)

14–17 October 2016

Seattle, Washington | Hosted by Purdue University

**SESSION 3: DEFORMING AND RECRYSTALLIZATION, SALON C**

Co-Chairs: Miroslav Urbanek, COMTES FHT; Yunzhi Wang, The Ohio State University

**SUNDAY, OCTOBER 16, 2016**

---

**Analysis and avoidance of flow-induced defects in hot deformation of  $\beta$ -solidifying  $\gamma$ -TiAl alloy: Simulation and experiment**

Wei Zhang, Central South University

**ABSTRACT**

In order to study the plastic deformation characteristics of  $\beta$ -solidifying  $\gamma$ -TiAl alloy in hot deformation process and find out the feasibility of using computer simulation to analyze and research the hot rolling process of the TiAl alloy billet, by means of commercial and professional plastic forming software DEFORM3D, the rolling process of TiAl billet was simulated. It is concluded that (1) the changes in the temperatures, stresses, and strains at the different regions of the billet were simulated during the entire rolling process, (2) based on the stress and strain distributions of the rolled billet, the forming defects analyze was proceeded. It is concluded that rolling force decreased with the elevation of rolling temperature and the reduction of rolling rate and pass reduction. Since the cooling rate of the sheet edges is faster with lower temperature, it is easy to generate stress concentrated in edge region during the deformation process. The greater the reduction is and the greater the damage is. In summary, in order to ensure the success of TiAl-based alloy sheet rolling, it should be used at higher temperatures, lower rolling reduction rate, and slower rolling rate.

**KEYWORDS:** TiAl alloy, hot rolling, DEFORM, simulation