

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

14–17 October 2016

Seattle, Washington | Hosted by Purdue University

SESSION 6: LIGHT ALLOYS, MARITIME HALL

Co-Chairs: Qigui Wang, General Motors Company Pontiac; Tongmin Wang, Dalian University of Technology; Jianxin Zhou, Huazhong University of Science and Technology; Lianxi Hu, Harbin Institute of Technology

SATURDAY, OCTOBER 15, 2016

**Numerical simulation of the through process of
aerospace titanium alloy casting filling, solidification,
and hot isostatic pressing**

Jian-xin Zhou; Zhao Guo; Ya-jun Yin; Chang-chang Liu, Huazhong University of Science and Technology

ABSTRACT

Titanium casting for casing is one of the key components of aerospace engines. Therefore, to predict and control the type of casting defects and performance in the forming process is extremely necessary. As one of the effective means of guiding production, the casting numerical simulation technology could help to optimize the casting process. However, since the forming defects are generally caused by the through process, including mold filling, solidification, and hot isostatic pressing process, the process simulations of separate studies have been unable to meet the requirements for titanium casting precision. Accordingly, aiming at precision castings of aerospace titanium casing, the numerical simulations of the through process were conducted. And the simulation results of hot isostatic pressing process were validated by actual experiments result. The results show that the displacement difference was substantially equal to the difference between the diameter of the hole displacement, which verifies the effectiveness of the guidance and numerical simulation methods. And it also provides the basis for numerical simulation of forming process of the subsequent casting.

KEYWORDS: titanium, filling, solidification, hot isostatic pressing, through process, numerical simulation