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3D CFD Simulation of Horizontal Spin Casting of High Speed Steel Roll¹ KONSTANTIN REDKIN, Swanson School of Engineering, Mechanical Engineering and Materials Science Department, University of Pittsburgh, Pittsburgh, PA, USA, BORIS BALAKIN, Department of Physics and Technology, University of Bergen, CHRISTOPHER HRIZO, WHEMCO Inc., Pittsburgh, PA, USA, JEFFREY VIPPERMAN, ISAAC GARCIA, University of Pittsburgh, UNIVERSITY OF PITTSBURGH TEAM, WHEMCO COLLABORATION, UNIVERSITY OF BERGEN COLLABORATION — The present paper reports some preliminary results on the multiphase modeling of the melt behavior in the horizontal spinning chamber. Three-dimensional (3D) computational fluid dynamics (CFD) model of the high speed steel (HSS) melt was developed in a novel way on the base of volume-of-fluid technique. Preliminary 3D CFD of the horizontal centrifugal casting process showed that local turbulences can take place depending on the geometrical features of the “feeding” arm (inlet), its position relative to the chamber, pouring rates and temperatures. The distribution of the melt inside the mold is directly related to the melt properties (viscosity and diffusivity), which depend on the temperature and alloy composition. The predicted liquid properties, used in the modeling, are based on actual chemical composition analysis performed on different heats.

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