

## (2) Prospect of Materials Processing Using Electromagnetic or Magnetization Force (Miscellany)

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## ベースメタル研究ステーションセミナー

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### 主題：二次精錬・連続鋳造分野の最近の進歩

#### (1) Simulation of Melt Flow and Inclusion Flotation in Continuous Casting Tundishes

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This presentation consists of two aspects of simulation of melt flow and cleanliness in tundishes. The first part deals with characterization of melt flow by a combined model which is normally used to analyze the residence time distribution of fluid in continuous casting tundishes. In this model, the fluid volume in tundish is considered to be consisting of the plug flow, well-mixed flow, and dead volumes. Although this model was proposed over 20 years ago, most researchers have either used it incorrectly or made an assumption in analyzing the melt flow in tundishes. Both approaches may lead to incorrect and misleading calculations of the dead volume. In this presentation, the combined model will be discussed and its correct application to tundish melt flow will be outlined. The second part of this talk deals with simulation of inclusion flotation in water models. The choice of model inclusion to water density and the model inclusion size needed for proper simulation of a given inclusion size in molten steel will be discussed. Thus, a procedure for flow characterization and

inclusion flotation and removal will be outlined.

#### (2) Prospect of Materials Processing Using Electromagnetic or Magnetization Force

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An Electromagnetic Processing of Materials, so called EPM which was born out of the rich association between Magnetohydrodynamics and Materials Processing has been developed in a worldwide scale during the last past years. EPM is spurred on success in various metals technology. Now EPM is going to face a new stage where a magnetization force instead of an Electromagnetic force is applied on not only metals but also electro non-conducting materials.

At first, as a typical example using the electromagnetic force, electromagnetic elimination of non-metallic inclusions is demonstrated in molten tin containing  $Al_2O_3$  inclusions. A travelling magnetic field is imposed on the molten tin flowing through a tube with a small diameter in which the motion of molten metal is considerably so suppressed as to enhance the electromagnetic effect. Succeedingly, curious phenomena relating to the magnetization force are shown and possibility of the development of a new EPM is discussed.

#### (2) Production Technology of Clean Steel

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