Inclusions In Continuous Casting Of Steel

Continuous Casting of Steel

EPD Congress 2013

In recent years, global metallurgical industries have experienced fast and prosperous growth. High-temperature metallurgical technology is the backbone to support the technical, environmental, and economical needs for this growth. This collection features contributions covering the advancements and developments of new high-temperature metallurgical technologies and their applications to the areas of processing of minerals; extraction of metals; preparation of refractory and ceramic materials; sintering and synthesis of fine particles; treatment and recycling of slag and wastes; and saving of energy and protection of environment. The volume will have a broad impact on the academics and professionals serving the metallurgical industries around the world.

Applied Science in the Casting of Metals

Computational Fluid Dynamics

Continuous Casting

Continuous Casting of Steel
Applied Science in the Casting of Metals focuses on metallurgical operations. The book first discusses the manufacture of iron and steel. Concerns include treatment of liquid iron and steel; treatment of molten iron between blast furnace and steelworks; and treatment of liquid steel. The text takes a look at casting pit practice, including ingot feeding, hot topping of alloy steels, methods of applying hot-tops, and hot-topping methods. The selection focuses on spray steel making and continuous casting of steel. The process involved in spray steel making; the basic principles of casting of steel; and metallurgical aspects are discussed. The text describes the treatment of cast iron; treatment of non-ferrous heavy metals; treatment of aluminum and magnesium alloys; and treatment of molding sand from molds and cores. The book explains the feeding of steel castings. Topics include development of exothermic feeding; mechanisms of alumino-thermic reactions; applications of exothermics to steel castings; and surface additions. The text is a valuable source of data for readers interested in metallurgical operations.

**Continuous Casting**

This fifth edition of the highly regarded family of titles that first published in 1965 is now a three-volume set and over 3,000 pages. All chapters have been revised and expanded, either by the fourth edition authors alone or jointly with new co-authors. Chapters have been added on the physical metallurgy of light alloys, the physical metallurgy of titanium alloys, atom probe field ion microscopy, computational metallurgy, and orientational imaging microscopy. The books incorporate the latest experimental research results and theoretical insights. Several thousand citations to the research and review literature are included. Exhaustively synthesizes the pertinent, contemporary developments within physical metallurgy so scientists have authoritative information at their fingertips. Replaces existing articles and monographs with a single, complete solution. Enables metallurgists to predict changes and create novel alloys and processes.

**Pores, Inclusions and Electromagnetic Stirring**

**Continuous Casting**

The diversity and specialization in orchid floral morphology have fascinated botanists and collectors for centuries. In the past 10 years, the orchid industry has been growing substantially worldwide. This interesting book focuses on the recent advances in orchid biotechnology research since the last 10 years in Taiwan. To advance the orchid industry, enhancement of basic research as well as advanced biotechnology will provide a good platform to improve the flower quality and breeding of new varieties. The important topics covered include the new knowledge of basic genome, through floral morphogenesis, floral ontology, embryogenesis, micropropogation, to functional genomics such as EST, virus-induced gene silencing, and genetic transformation.

**Effect of Steel Manufacturing Processes on the Quality of Bearing Steels**

Continuous casting is an industrial process whereby molten metal is solidified into a semi-finished billet, bloom, or slab for subsequent rolling in finishing mills; it is the most frequently used process to cast not only steel, but also aluminium and copper alloys. Since its widespread introduction for steel in the 1950s, it has evolved to achieve improved yield, quality, productivity and cost efficiency. It allows lower-cost production of metal sections with better quality, due to the inherently lower costs of continuous, standardized production of a product, as well as providing increased control over the process through automation. Nevertheless, challenges remain and new ones appear, as ways are sought to minimize casting defects and to cast alloys that could originally only be cast via other means. This
Special Issue of the journal "Metals" consists of 14 research articles that cover many aspects of experimental work and theoretical modelling related to the ongoing development of continuous casting processes.

**Inclusion Control in a Continuous Casting Tundish**

This book presents a scientific approach to metal casting design and analysis supported by software tools. Unlike other books in metal casting focused only on the process know-how, this book uncovers the know-why as well. Besides serving the needs of students of mechanical, production and metallurgical engineering, this book is equally meant to benefit practicing engineers involved or interested in casting development, including product designers, toolmakers, foundry engineers, supply chain managers, engineering consultants, researchers, and software developers. The theory discussed in the book is applicable to all types of castings: ferrous and non-ferrous, produced in sand and metal moulds. By gaining a better understanding of the theory and logic involved through creating, analysing and optimizing virtual castings, the readers will learn how to: Design process-friendly cast products, leading to shorter development time Manufacture assured quality castings, leading to fewer rejections and 'surprises' Manage material and energy utilization, leading to higher yield and lower costs.

**Fluid Flow Related Phenomena and Inclusion Motion in Continuous Casting Strands**

**Continuous Casting of Ferrous and Non-ferrous Metals**

**Quantitative Inclusion Ratings and Continuous Casting**

This book is planned to publish with an objective to provide a state-of-art reference book in the area of computational fluid dynamics for CFD engineers, scientists, applied physicists and post-graduate students. Also the aim of the book is the continuous and timely dissemination of new and innovative CFD research and developments. This reference book is a collection of 14 chapters characterized in 4 parts: modern principles of CFD, CFD in physics, industrial and in castle. This book provides a comprehensive overview of the computational experiment technology, numerical simulation of the hydrodynamics and heat transfer processes in a two dimensional gas, application of lattice Boltzmann method in heat transfer and fluid flow, etc. Several interesting applications area are also discusses in the book like underwater vehicle propeller, the flow behavior in gas-cooled nuclear reactors, simulation odour dispersion around windbreaks and so on.

**Continuous Casting**

This book contains chapters on cutting-edge developments presented at the TMS annual conference of 2012.

**EPD Congress 2012**

**Transverse Cracking in Continuously Cast Products**
To improve the efficiency of the continuous casting process and the quality of its products, this dissertation mainly investigated fluid flow related phenomena and inclusion motion in continuous casting. Mathematical simulation was performed for this purpose. Both a slab caster and a billet caster were investigated. In the study of the slab caster, the application of electromagnetic brake field on the slab mold was evaluated. The results indicated that the magnetic force decelerated the high speed steel jet, stabilized the top fluctuation, and prevented the bias flow inside the mold. The other study of this slab caster involved the fluid flow features during the transient casting process. It included casting start, casting speed variation, and temperature fluctuation. Especially for the casting start, the entire process was simulated using the volume of fluid multi phase model and dynamic mesh method. The results indicated the serious entrainment of air during the filling process and large fluctuations in the top surface level at the beginning of dummy bar moving. In the billet caster study, billet samples were collected from an industrial trial. The features of the nonmetallic inclusions were characterized by automated particle analysis and the size and spatial distribution of nonmetallic inclusions were determined. Mathematical models were developed to predict the entrapment locations of inclusions in the solidifying shell and compared to the industrial results. The distribution of inclusions predicted through mathematical modeling in the cross section of billet was in good agreement with the sample measurements.”

Inclusion Behaviour Under a Swirl Flow in a Continuous Casting Process

Promotion of Inclusion Float-out in Continuous Casting Tundish Bath by Gas Blowing

CFD Modeling and Simulation in Materials Processing 2016

Continuous Casting: Chemical and physical interactions during transfer operations

The Continuous Casting 2000 symposium maintains the tradition established in 1976 of holding regular events. This millennium event,
however, is the first international meeting of the series. The aim is to highlight the importance of continuous casting - of aluminum, copper and magnesium - to the international fabricating industry, focusing on technological advances in all the sectors that are important for the manufacture of high quality continuous cast products.

Inclusion Motion Under a Swirl Flow in the Continuous Casting Process and Wire Feeding in the Induction Furnace

Continuous Casting

Inclusion Behaviour in the Liquid Core During Continuous Casting

11th International Symposium on High-Temperature Metallurgical Processing


METAL CASTING

Continuous Casting of Steel

Continuous Casting

The limitations of the Jernkontoret (JK) method of assessing inclusions as described in ASTM E 45 are pointed out and two alternative quantitative methods of inclusion assessment presented in detail. Close relationships are demonstrated between the rolling contact fatigue life and the quantitative inclusion assessments for 25 different casts of Society of Automotive Engineers SAE 52100 type steel. From this, the SAM B-type count shows the closest relationship with fatigue life. Inclusion of the SAM count in steel specifications has improved the monitoring of steel quality from suppliers. The quality of continuous-cast bearing steel from four European suppliers is described and rules are drawn up defining the optimum method of steel manufacture and mechanical working.

Tundish Technology for Clean Steel Production

Reviewing an extensive array of procedures in hot and cold forming, casting, heat treatment, machining, and surface engineering of steel and aluminum, this comprehensive reference explores a vast range of processes relating to metallurgical component design-enhancing the production and the properties of engineered components while reducing manufacturing costs. It surveys the role of computer simulation in alloy design and its impact on material structure and mechanical properties such as fatigue and wear. It also discusses alloy design for various materials, including steel, iron, aluminum, magnesium, titanium, super alloy compositions and copper.

TMS 2012 141st Annual Meeting and Exhibition, Materials Properties, Characterization, and Modeling
This state-of-the-art reference presents papers from one of the largest annual gatherings of extraction specialists from around world, the 2013 Annual Meeting of The Minerals, Metals & Materials Society. Addressing many aspects of extraction and processing metallurgy, this volume covers in three sections modeling of multi-scale phenomena in materials processing; production, refining, and recycling of rare earth metals; and solar cell silicon. Essential reading for scientists, engineers, and metallurgists in the global extractive and process metallurgy industries.

The Making, Shaping, and Treating of Steel

Continuous Casting