

TUESDAY, AUGUST 24, 2004, A.M.

SESSION 12: FOURTH INTERNATIONAL SYMPOSIUM ON ADVANCES IN REFRACTORIES FOR THE METALLURGICAL INDUSTRIES

STEELMAKING (II)

Sponsors: Materials Science and Engineering, The Metallurgical Society of CIM, The Refractory Ceramics Division of the American Ceramic Society and The Canadian Ceramic Society.

Room: Webster A

Chairmen: T. SHELLHAMMER, ISG Research, Bethlehem, Pennsylvania, U.S.A., and R. MISHRA, Orind Refractories Ltd, Bayuquan, Laoning, China

PAPER 12.1 — 8:30

THE DEVELOPMENT AND APPLICATION OF Al_2O_3 -SiC-C BRICKS FOR TORPEDO CARS IN CHINA.

Y. ZHAO, L. MA, Shangyu Dongshun Refractories Co., Zhejiang, China, and B. ZHU, Wuhan, Hubei, China

With the wide adoption of iron pretreatment technology, the function of torpedo cars is drawing more attention from Chinese steel mills. More and more torpedo cars are put into operation with liquid iron pretreatment. In this paper, the new technology, production and development of Al_2O_3 -SiC-C bricks for torpedo cars in China are highlighted. The current application and main requests for the Al_2O_3 -SiC-C bricks are also addressed in details.

PAPER 12.2 — 8:55

HOT METAL DESULPHURISING: REDESIGNING THE HOT METAL LADLE LINING AT CORUS IJMUIDEN.

A.P. SCHMIDT, G. DÖSAM, S.S.J. VAN DER WAL and M. SPREIJ, Corus, IJmuiden, The Netherlands

The transfer of hot metal desulphurising from the torpedo cars to the hot metal ladles at the IJmuiden BOS plant no.2 caused a decrease in ladle lining life from 680 to 470 heats. Changing the desulphurising agent CaC_2 for CaO during a trial period, for environmental reasons, led to a further decrease in refractory life. Availability of the ladles became critical and the major reasons for the low life were identified. Solving one of them, temperature, quickly resulted in restoration of the original lives. However, re-introduction of the new desulphurising agent on 50% of the heats again resulted in a decrease, this time from 700 to 550 heats. In order to be prepared for the full introduction of the new agent, thorough investigation of worn linings was conducted, revealing the major (chemical) wear mechanisms. With these findings, a new design for the hot metal ladle is proposed.

PAPER 12.3 — 9:20

DEVELOPMENT AND APPLICATION OF CHROME-FREE REFRACTORY FOR STAINLESS STEEL MAKING — A STEP TOWARDS ECO-FRIENDLY REFRACTORY.

S. MUKHOPADHYAY, R. MISHRA, M.K.S. VEL and S. KUMAR, Orind Refractories Ltd., Bayuquan, Liaoning, China

Off late, the criteria of selecting the refractory have acquired a trend line aiming to a cleaner environment and the utmost importance is given to the eco-friendly approach. The stainless steel making furnaces normally use mag-chrome refractories for the obvious reasons of changing slag basicity from acidic to basic. Such refractories generate toxic fumes and compounds with hexavalent chrome, which is unhygienic if inhaled. The present paper describes the development of a chrome free alumina magnesia carbon refractory, its different test properties, simulative testing and microstructures. The optimum quantity and distribution of carbon in the brick restricts the carbon pick-up by the steel. Bricks with the same composition were manufactured in the commercial scale and used in a stainless steel making furnaces in USA. The performance of same refractory in this furnace was quite encouraging and at present the same quality brick has become a normal practice in this furnace. Since no chromite is used in making this brick, so no toxic compounds is generated environment remains pollution free.

PAPER 12.4 — 9:45

THE THERMAL BEHAVIOUR IN BINDING SYSTEM OF ALUMINA BASED CASTABLES IN A TEMPERATURE RANGE 20-1000°C

N. Zhou, Henan University of Science and Technology, Luoyang, China

Abstract Is Not Available.

COFFEE BREAK — 10:00 – 10:40

PAPER 12.5 — 10:40

THE PERFORMANCE OF NEWLY DEVELOPED REFRACTORIES FOR CONTINUOUS CASTING.
K. MORIKAWA, J. YOSHITOMI and K. ASANO, Krosaki Harima Corporation,
Kitakyushu, Fukuoka, Japan

The quality requirements for ladle shrouds have become stricter year by year to the pursuit of higher productivity and improved quality in the continuous casting of steel. The ladle shrouds must be sufficiently durable under severe conditions, such as operation without preheating and during several sequential castings. The consideration is that ceramic fibres, which have been applied in shrouds for thermal insulation during casting, could pose a risk to the worker's health.

We realized materials for the ladle shrouds which show high strength and low elasticity. At the same time pursuing effective insulation, a coating which contains no fibres (Foaming Coat) has been developed, replacing the conventional one containing fibres. These materials are durable under conditions of repetitive use and consequently satisfy the customer's demands. The ladle shrouds which were improved in this way have achieved an excellent durable life in hot service of three times that of conventional ones. This paper reports the recent technological developments in ladle shrouds as well as their performance under hot operating conditions.

PAPER 12.6 — 11:05

ADVANCED DESIGN OF REFRACTORY COMPONENTS FOR CONTINUOUS CASTING.

Y. VERMEULEN, P. GUILLO, Vesuvius Research, Pittsburgh, Pennsylvania, U.S.A.,
J. SIMOES, Vesuvius International, and
A. DI DONATO, Centro Sviluppo Materiali, Roma, Italy

New design techniques have been developed to optimize continuous casting (CC) refractory components. The overall objective is to increase CC productivity as well as steel quality by using optimized refractory from tundish-to-mold. These techniques allow the prediction of steel and refractory chemical interactions and, thus, steel chemistry evolution as well as build up and corrosion occurrence. Specific fluid-dynamic models (CFD) have also been developed to better take into account the physical parameters at the steel/refractory interface and to optimize steel flow control. The CFD model can be coupled with refractory chemical interactions to simulate steel chemical evolution. These two different approaches result in shape and material modifications. They are completed by dedicated thermal stress analysis in order to improve thermal shock resistance. The mechanical FEA evaluations take into account specific mechanical behavior of refractory components as well as high temperature evolution of their properties.