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Cover Photo:

The Cover shows single Snorkel Refining Furnace at No. 2 Steelmaking Shop in TISCO. More details can be found in the manuscript Jiang et.al.

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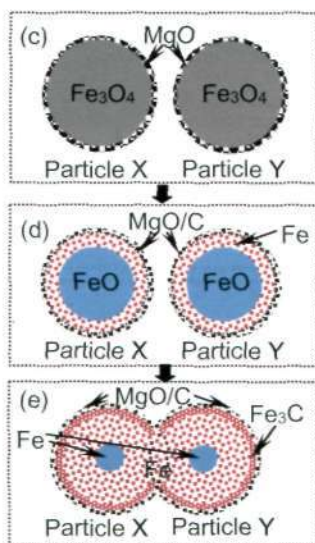
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Contents

Full Paper

J. H. Shao, Z. C. Guo, and H. Q. Tang
Effect of Coating MgO on Sticking Behavior during Reduction of Iron Ore Concentrate Fines in Fluidized Bed

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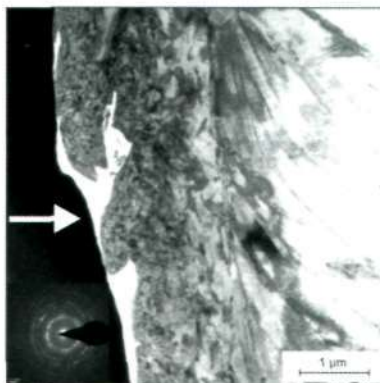
If being coated with MgO, magnetite particles will not sticking each other when they are reduced to the same metallization rate in fluidized bed with CO-H_2 mixtures as that of sticking particles without coating. Because coating MgO can not only decrease the chance of touch between metallic iron on the surface of different particles, but also provides the action time for carbon deposition and the production of Fe_3C with low viscosity.

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Российской академии наук (ЦНБ УрО РАН)

Contents

H. Berns*, N. Nabiran*, and L. Mujica*
High-Interstitial Stainless Austenitic
Steel Castings

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Sand castings produced of steel GX25CrMnN18-18 with ~0.6 mass% N reached a proof strength $R_{p0.2} = 457$ MPa and a reduction of area $Z = 60\%$. The resistance to pitting corrosion was better than that of steel X5CrNi18-10 and the resistance to impact wear equal to that of Hadfield manganese steel. An amorphous and nanocrystalline layer is formed in the wear surface.

B. Harscik* and G. Karoly
Controlling Nozzle Clogging by
Secondary Steelmaking Without
Reheating

EDITOR'S CHOICE

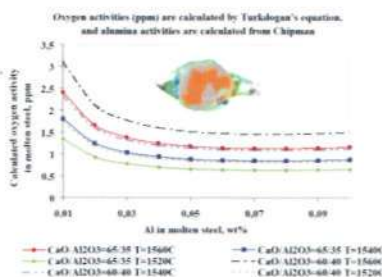
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Ever since continuous casting was introduced, nozzle clogging has been a common casting disorder. If we want to reduce the rate of nozzle clogging we have to know the deposits on nozzles. In this article the authors analyze the deposits and investigate their origin. The authors study metallurgical solutions to reduce the deposits in nozzles without calcium treatment and reheating.

K. Riyahimalayeri, P. Ölund*, and
M. Selleby
Oxygen Activity Calculations of
Molten Steel: Comparison With
Measured Results

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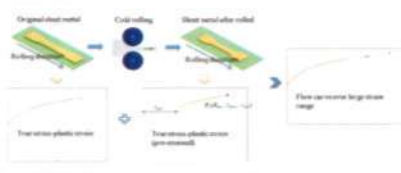
This study sets out to find some model/s that could calculate the closest oxygen activity of molten steel to the measured oxygen activity in an ASEA-SKF ladle furnace. It was concluded that increasing the wt% Al from 0 up to 0.05 in molten steel, increasing CaO/Al₂O₃ ratio in top slag, and reducing equilibrium temperature of slag-steel could contribute to reduction of oxygen activity of molten steel. The SEM observations revealed that the main types of observed nonmetallic inclusions in these samples were spinels and calcium aluminates and by increasing the CaO content of the inclusions their equivalent circle diameters grew.

Contents

X. Zhuang, Z. Zhao*, H. Li, and H. Xiang

Experimental Methodology for Obtaining the Flow Curve of Sheet Materials in a Wide Range of Strains

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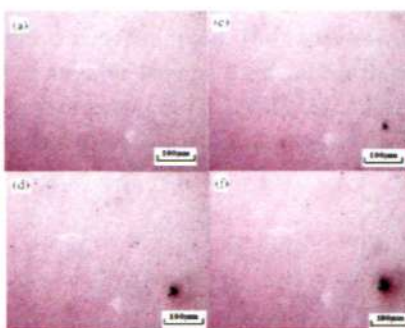


An experimental methodology, by applying different degrees of cold working on the sheet material before tensile test, was proposed to obtain flow curve over large strain range, which was verified by compression test combined with inverse modeling. In addition, five commonly used extrapolation equations were estimated based on the results from above-mentioned methodology.

X. Li, L. Guo, D. Han, J. Li, and Y. Jiang*

In Situ Observation of Surface Electrochemical Activities of Lean Duplex Stainless Steel LDX 2101

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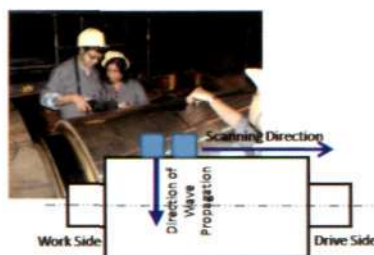


It is well known that the pitting corrosion resistance of duplex stainless steels (DSS) is determined by the weaker phase. In our present work, it can be controlled for pits to initiate in the weaker phase of the economic lean DSS LDX2101 using a potentiostatic pulse technique. Meanwhile, the detailed *in situ* pitting initiation information can be observed with a long working distance microscope.

S. P. Sagar*, G. V. S. Murthy, T. K. Das, A. Prakash, U. S. Goel, and T. Venugopalan

Surface Wave Based Ultrasonic Technique for Finding the Optimal Grinding Condition of High Speed Steel (HSS) Work Rolls

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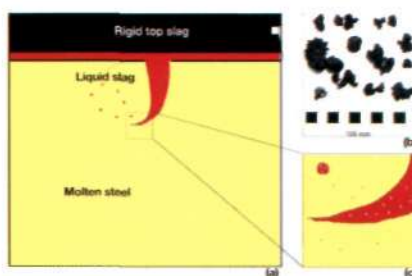


The high speed steel rolls have high hardness and good wear resistance at high temperature. This type of roll is used in finishing applications for increased campaign times and better surface finish. This paper describes the application of surface wave ultrasonic technique to detect fine surface cracks and to establish the optimal grinding condition for obtaining crack free roll surface. Implementation of this technique at the Hot Strip Mill of Tata Steel, India reduces the rate of roll failures drastically.

N. Å. I. Andersson, A. Tillander, L. T. I. Jonsson, and P. G. Jönsson*

Investigating the Effect of Slag on Decarburization in an AOD Converter Using a Fundamental Model

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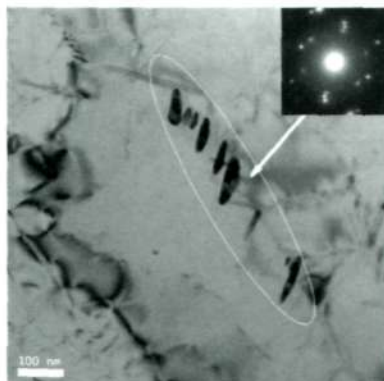
The figure illustrates our distinction between different types of slags that exist in an AOD. The first stage of injection was simulated for different amounts of a rigid top slag (Figure 3b). Also, the separation of solid chromium oxide in steel to the liquid slag (Figure 3c) was included. It was found that a higher CRE value is theoretically achievable if the amount of top slag can be reduced. Also, the CRE maximum is delayed by the degree of chromium oxide separation to liquid slag.

Contents

W. Wang, W. G. Zhao*, and J. B. Qu

Effect of Heat Treatment on Micro-structure and Mechanical Properties of 2.25Cr-1Mo Steel

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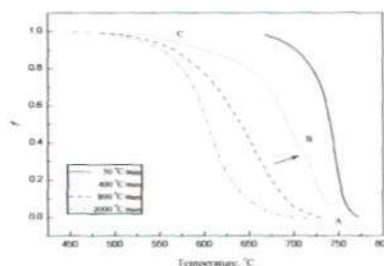


After the normalizing and tempering, simulated post-welding heat treatment and step cooling, the carbide precipitates of the ferritic heat-resistant steel 2.25Cr-1Mo evolve from M_3C to M_7C_3 and $M_{23}C_6$. The coarsening of carbides deteriorates impact toughness, and the morphology, crystal structure, and chemical composition of carbides are also important influencing factors.

J. Huo, Y. C. Liu*, D. T. Zhang, Z. S. Yan, and Z. M. Gao

Isochronal Phase Transformations of Low-Carbon High Strength Low Alloy Steel upon Continuous Cooling

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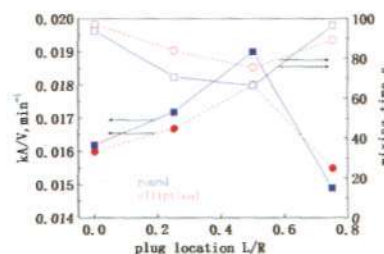


Effects of cooling rates on transformation kinetics and microstructures of the low-carbon HSLA steels were investigated. Polygonal ferrite + pearlite, acicular ferrite, and bainitic ferrite transformed due to the cooling rates increasing from 5 to 3000°C⁻¹. Acicular ferrite was marked by high dislocation density and M/A islands embedment. Increasing cooling rate accelerates acicular ferrite transformation and refines the steel's matrix.

Q. Rui*, F. Jiang, Z. Ma, Z. You, G. Cheng, and J. Zhang

Effect of Elliptical Snorkel on the Decarburization Rate in Single Snorkel Refining Furnace

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For both the round and elliptical snorkels, the volumetric mass transfer coefficient kA/V first rises with the increase of L/R , and reaches the largest value when L/R is 0.5. After that, it decreases with the increase of L/R . These phenomena may be attributed to changes of mixing characteristics in the ladle.