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Prediction of Blended Coal Fluidity and Lateral Contraction of Coal in Coke Ovens -Technology for Increasing Charging Ratio of Low Quality Coal in Cokemaking -

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Synopsis :

New models for estimating the maximum fluidity (MF) of blended coal and the clearance between the coke oven wall and coke cake were developed to reduce hard pushing rate in coke ovens. In the MF model, heated coal during carbonization is regarded as a suspension composed of melted coal, unmelted coal and solidified coke. The viscosity of the suspension was evaluated by Mori s equation, which included the viscosity of the solvent and volume fractions of solid. The clearance model is based on the balance between the contraction force and coking pressure. A clearance begins to appear when the contraction force exceeds the coking pressure in this model. The contraction force is calculated in consideration of the visco-elastic behavior of the thermal shrinkage of coke. The coking pressure is calculated from the generation and dispersion of gas in the melting layer. Use of these models in the coal blending design system has successfully reduced the hard pushing rate. Moreover, precise control of coke strength with the new system has made it possible to increase the use of low-grade coal.

配合炭流動度およびコークス収縮量予測モデル —コークス炉における劣質炭多量配合操業—*

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Prediction of Blended Coal Fluidity and Lateral Contraction of Coal in Coke Ovens —Technology for Increasing Charging Ratio of Low Quality Coal

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要旨

[redacted]

動度曲線の重ね合わせによる推定方法[6~8]や，配合炭のペトログラ

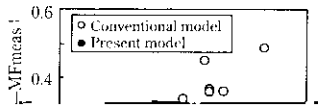
$$S_T = (d_T/d_0)^3 \quad \cdots\cdots (5)$$

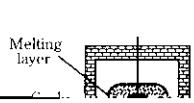
$$d_T = A \cdot T + B \quad \cdots\cdots (6)$$

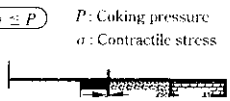
れも推定精度が十分とは言えない。

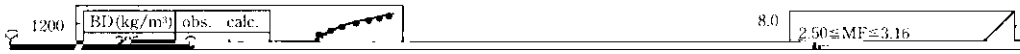
筆者らは劣質炭を多量配合していく上で配合炭の流動度とコークス収縮量の精密な評価が不可欠と考え，配合炭の流動度を懸濁液の

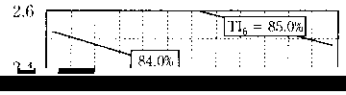
定数 A，B は，軟化過程では軟化点と最高流動温度の粒子径から，固化過程では固化点と最高流動温度の粒子径で，それぞれ算出する。

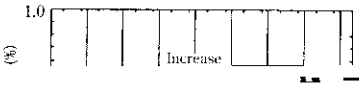

0.6
0.4
MFmeas
Conventional model
Present model


Melting
layer


σ ≅ P
P : Coking pressure
σ : Contractile stress


1200
BD(kg/m³)
obs.
calc.
8.0
2.50≦MF≦3.16


2.6
2.4
TI_6 = 85.0%
84.0%


1.0
(%)
Increase