Modelling of gas and char flows at high PCI through experimental and theoretical studies of the raceway and the dead man - Final report

Project ID: 7210-AA/219
Funded under: ECSC-STEELRES 8C

Abstract
The project consisted of four parts performed at different research centres:

- Study of blast furnace dead man at high PCI (CSM).
- Experimental studies on raceway dimensions and gas circulation in relation to the combustion of injected coal (CENIM and Aceralia).
- Further productivity increase by injection of metallised ore fines at high PCI (RWTH Aachen).
- Modelling of gas and char flows at high PCI (CRM).

Several mathematical models of the dead man were developed, but only two were sufficiently reliable for the simulation of the whole blast furnace descent in terms of descent velocity, stress field and material segregation. The experimental studies of the raceway have been carried out in two methacrylate models and in a coke gasification chamber placed on a weighing platform. These models contributed to an understanding of the physics of blast furnace raceways.

A coal-based metallisation process for iron ore fines has been designed for sticking-free operations. The simulated injection of metallised fines into the blast furnace or the charging of briquetted metallised material from the top, leads to noticeable increases of productivity at slightly reduced costs. At CRM, a mathematical model simulating the main phenomena of the blast furnace was calibrated by vertical probings and by gas tracings. The model shows the strong influence of the burden distribution pattern on the gas distribution and on the different operating results. Simulations of coal rate increase revealed no significant modification of the gas distribution.

Additional information

Authors: DANLOY G, CRM, Liège (BE);MIGNON J, CRM, Liège (BE);FALZETI, CSM, Rome (IT);CHIAROTTI U, CSM, Rome (IT);FORMOSO A, CENIM, Madrid (ES);ISIDRO A, CENIM, Madrid (ES);HERFURTH E, RWTH Aachen (DE);NEUSCHÜTZ D, RWTH Aachen (DE);VEGA J, Aceralia, Aviles (ES)


Last updated on 2002-04-19
Retrieved on 2019-05-31

© European Union, 2019