

Optimization of the COREX[®] Process Through the Application of Advanced Process Models

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ABSTRACT

Process simulation with mass and heat balancing models allows a detailed process analysis and adjustment of the plant operation and is thus the key to improved plant operation results.

VAI's solution for the optimization of the COREX[®] Process, comprising a highly effective series of dynamic process models, is introduced. In addition to providing flexible and optimized process functions, this solution enables a fully transparent mode of operation. The system architecture is based on the latest software technology and model results are graphically presented using 3D methods. As a typical application, the COREX[®] balancing model is discussed in more detail.

I. INTRODUCTION

VAI is one of the leading suppliers of integrated automation solutions for the entire chain of iron and steel production technologies. In addition to the supply of optimization packages for the blast furnace, VAI-developed process models are integrated in all COREX[®] plants in operation and under construction.

These models feature an object-oriented program design based on so-called *special-class libraries* in combination with graphical user interfaces. Model calculations simulating plant operations, essential for the plant personnel to adjust and fine-tune the process, thus allow the entire smelting-reduction process to be optimized in accordance with the objectives.

II. THE COREX[®] PROCESS

The basis for today's COREX[®] technology was the KR Process (for Kohle Reduktion or coal reduction) which had the target of producing hot metal from pre-reduced iron in a fluidized bed. In the years 1977 and 1978 Ralph Weber carried out initial pilot plant tests at Paine, Brazil. In 1978 the first patent for the KR Process was registered by Ralph Weber, Walter Maschlanka and Gerhard Sanders^[1].

In 1979 Willy Korf bought the patent rights and know-how. He invited the former VOEST-ALPINE AG (VA) to develop this process, jointly with Korf Stahl AG, to industrial maturity. In the