Engineering studies for hot-blast stoves

For a Better Blast

Interested in saving money in your blast-furnace operations? As a full-line supplier of all blast-furnace equipment and solutions, Siemens VAI can help you to optimize production by assessing plant parameters and performance, followed by expert modernization advice. In this article, the focus is on improvements for hot-blast stoves.

The blast-furnace process is the largest consumer of energy within an integrated steelworks and the hot-blast stoves are one of the main equipment sections that needs to be working efficiently for optimized blast-furnace performance. These are major consumers of energy, so they must be in top condition to keep fuel requirements down and CO_2 emissions at a low level. Siemens VAI offers a variety of stove studies and health-check investigations to enhance stove performance, leading to better ironmaking operations and production.

Get the most from hot-blast stoves

The application of computational fluid dynamics (CFD) investigations allows existing designs to be evaluated and new ideas to be tested prior to implementation. Using the in-house stove design model from Siemens VAI, actual operational data and stove performance can be reviewed against model-predicted data. Stove improvements for planned rebuilds or repairs can also be forecast with this model, and completely detailed stove-sizing investigations carried out. It is even possible to evaluate the increased fuel consumption during the rebuild period when one stove is under repair, or the feasibility of installing an additional stove to ensure continuous hot-metal production.

Physical inspections can include external checks of the shell, an internal examination with an endoscope, assessment of field measurements (e.g., chequer-chamber pressure drop) and a review of the control-system configuration. Additional equipment-feasibility reviews with respect to the installation of new equipment, such as waste-heat recovery, can also be performed.

Fuel optimization for the operation of a new stove design can be calculated, including the potential cost savings and return on investment. Furthermore, the net blast-furnace performance, hot-metal costs and capital requirements can also be determined in the course of the engineering studies with consideration to variable stove-enrichment gas quantities, coke rates and coal-injection rates and productivity, etc.

Recent industrial examples

Stove studies were recently carried out at four U.S. production sites. The objectives included increasing the hot-blast temperature and capacity as well as improving energy efficiency. At one site, a process and economic analysis of hot-blast stove rebuild options was carried out in preparation for a planned blast-furnace modernization. At a second steel mill, a new stove design was proposed. At a third location, Siemens VAI will provide two new stove designs for two blast furnaces expected to be rebuilt by 2011. Inspection of stoves by Siemens VAI at a fourth site showed that they were in poor condition. A repair plan was proposed that included defining refractory supply requirements and an accelerated installation schedule. ■

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