

Start-up of the No. 3 Blast Furnace of JSW Steel Ltd.

India's Largest Blast Furnace



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JSW Steel is the fastest-growing private-sector steel company in India. In order to increase steel production from four to seven million tons of steel per year, the company launched its so-called Cheetah project. Major investments were made in new hot-metal-production and steelmaking facilities. For the new blast furnace, Siemens VAI received the order for the design and supply of all primary blast-furnace equipment and technical services for construction and commissioning. This included the copper stave coolers, the pulverized-coal injection system and a high-efficiency hot-blast stove plant. A complete automation package was also installed, highlighted by the VAiron expert system for hot-metal production and quality control. Site construction was provided by JSW Steel.

The blast furnace has a hearth diameter of 13.2 m and an inner volume of over 4,000 m³. It was designed as a free-standing, stave-cooled shell inside a splayed-leg tower and is equipped with 36 tuyeres and 4 tapholes. The furnace operates with a high top

pressure (2.5 bar g) and high hot-blast temperature (1,250°C). This allows a coal-injection rate of up to 200 kg/t of hot metal to be employed, reducing operating costs. The furnace is also provided with modern environmental-protection systems, including a de-dusting cyclone and venturi scrubber for gas cleaning, cast-house and stock-house de-dusting systems and a slag-granulation plant. The energy of the furnace top gas is recovered by a 11-MW top-gas-recovery turbine.

In order to use the top gas for heating purposes in other parts of the integrated steelworks, the gas is cleaned in a two-stage plant. In the first stage, a specially developed cyclone from Siemens VAI removes iron-laden dust, which is re-used in iron production. Up to ten metric tons can be recovered per hour. The new cyclone allows highly flexible control of the dedusting process, optimizing iron recovery while simultaneously preventing concentrations of heavy metals such as zinc to accumulate, which can reduce the useful life of the furnace's refractory lining.

On February 18, 2009, in the presence of Managing Director Sajan Jindal, Blast Furnace No. 3 of JSW Steel Ltd. was successfully started up at the company's integrated iron and steel works at Toranagallu, in the southern Indian state of Karnataka. With a nominal annual capacity of 2.8 million metric tons of liquid iron, it is the largest blast furnace in India today. Siemens VAI was the technology provider for this plant.



State-of-the-art automation system



First tap of hot metal on February 19, 2009

Closed-loop control with VAiron expert system

The furnace is equipped with a wide array of sensors to monitor the gas flow and temperatures within the furnace. The data is collected and evaluated by the sophisticated automation system, which is comprised of a number of Level 2 control models to regulate furnace burdening and material distribution. The suite of software applications is completed by the closed-loop Simetal BF VAiron expert system, which is able to control the furnace heat level and production rates, ensuring optimized furnace operation and low fuel rates. Simetal BF VAiron has been installed in more than 70 blast furnaces worldwide.

First tapping of hot metal

The start-up of the blast furnace was carried out by JSW Steel with the support of a multi-discipline team of specialists from India, the U.K. and Austria. The first tapping of hot metal took place 23 hours after the furnace was lit. Close interaction between all members of the start-up teams ensured that the production tar-

gets were quickly and safely met without incident. The build-up in production coincided with the hot-commissioning schedule of the new steelmaking plant and continuous-casting machines. After one month of operation, the furnace was producing 7,000 tons of hot metal per day, which is 90 percent of its rated output.

Concluding remarks

The successful completion of this blast-furnace project underlines the experience and expertise of Siemens VAI in the design and construction of large-scale blast furnaces. The outstanding cooperation between the teams of JSW Steel, Siemens VAI and other suppliers, as well as the highly professional project execution, were decisive factors for the rapid plant start-up and fulfillment of JSW Steel's production targets. ■

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