Successfully meeting the requirements of internal and external stakeholders with an efficient and clean EAF operation

EAF and offgas system optimisation project at Kalyani (India) with supply of high temperature quenching, damper control and electrode regulation system

In October 2011, Kalyani Carpenter Special Steels Ltd. installed a BSE Chemical Energy System featuring virtual lance burners and carbon injectors in the furnace shell (see article in BSE Newsletter 2-2012). The resulting increased productivity made further adaptations to the EAF and offgas system necessary. Due to the excellent cooperation and performance of the new system, the team of Kalyani decided to go ahead with BSE for a further comprehensive EAF optimisation project.

Project targets
Already with the installation of the chemical energy system, efficiency of the 35 tons AC-EAF at the meltshop in Pune, Maharashtra improved considerably (reduction of power-on time by more than 5 minutes and reduction of electrical energy consumption by more than 40 kWh/t). Although the new optimisation project should give a further boost to productivity, another important target was to reduce operating cost and maintenance efforts. No less important than the productivity and efficiency targets were environmental requirements such as the reduction of dioxin/furan level to comply with today’s and future governmental limiting values. Moreover, existing equipment should be reused as far as possible to keep the total investment cost low.

Offgas system
In order to find an optimum solution, combining the local experience of Kalyani and BSE project know-how, a conceptual engineering study for the whole offgas system was conducted by BSE. Based on the outcome of this study, the primary bag house was dismantled, whereas the secondary bag house was extended according to BSE specifications. New fan impellers were installed and the tubular cooler replaced by a BSE High Temperature Quenching (HTQ) system. BSE supplied the valve rack for the HTQ system and the detail engineering for the HTQ chamber. Furthermore, the automation of the existing offgas system was adapted and upgraded with a damper control system, allowing a flexible flow rate control.

EAF equipment
According to the initial contract, BSE should investigate the required adaptations and further optimisation potential for the EAF, for example an increase of electrical energy input. After observations at site and desktop analyses at BSE, it was mutually agreed to extend the contract with implementation of a new electrode regulation system (AMGGE) and also with installation of selected new equipment related to electrode movements such as complete mast roller guide boxes and electrode mast with plunger cylinder.

Results / Benefits
In November 2012, the components for the EAF and offgas system were installed. Immediately, maintenance and operating costs decreased, e.g. due to reduction of power-on time by approximately 8% as well as reduction of water-cooled ducts respectively cooling water consumption. At the offgas system, first results showed a considerably increased primary and secondary flow rate, thus an overall increased dedusting efficiency, which enabled Kalyani to run the EAF at full load in a dust-free meltshop. Beside the financial benefits of the increased productivity and efficiency, also the initial investment in the conceptual engineering study paid off for Kalyani, because existing equipment such as the fan motors and the secondary bag house could be reused, keeping the total investment cost comparatively low.

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