Hidden potential in DC arc furnace regulating systems

BSE had been awarded to implement “Set point Modification of Power input” and to set up the so called “DC-Online System” at site. The goal of this project was to upgrade the regulation software, get permanent access to the parameters and then to tune the regulation. The DC arc furnace with 90 MVA / 110 kA is equipped with an ABB regulating system which was installed in 1993. This installation was a “black box”, no access was possible, the reason being that simply no programming device was supplied during commissioning. The following actions have been done at site:

**BSE SERVICES**

1. **DC-ONLINE MEASURING SYSTEM**

The melting process was observed with the DC-Online Monitor system and the settings of the voltage regulator were optimized. The main problem the system showed before optimization was a large negative set-point deviation of the DC voltage, long short circuit durations of up to 20 seconds and very slow electrode movements. These conditions were obvious at a glance with the DC Online Monitor.

2. **PERMANENT OPENING OF “BLACK BOX DC REGULATOR”**

Not being able to make any adjustment on the regulation system is limiting the ability of own optimization of AnnJoo Steel personnel. Therefore it is essential to “open” the “black box” in order to understand the functions of the system.

A respective expert of AnnJoo Steel has been trained to understand how to use the system and how to be able to adjust the set-points by himself. This shall ensure to realize the highest power input.

3. **PROCESS KNOW HOW AND SOFTWARE UPGRADE**

The BSE expert advised the ABB expert how to modify the parameters by assessment of the arc furnace operation with the DC-Online Monitor.

The system was opened by an ABB expert using a regular downtime of 8 hours during a five day optimization campaign. The software upgrade was installed, which provided enhanced regulating performance.

**RESULTS/ BENEFITS**

The optimization shows: less current fluctuation and less voltage set-point deviation resulting in:

- 6 MW more active power input
- 3 Min less power-on time

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"… and the furnace is running very well ....
The PON average about 36 min and latest achievement on 27/6, we produced 28 heats with highest production in history. Thanks for your help and good support from BSE and ABB."

28th June 2007 via email from Rakhidin Osman, AnnJoo Steel / Malaysia (3 days after campaign)

Side aspects leading to further challenges:

Transforming a “Volkswagen into a Porsche” is not “free of charge”. Such a „Formula 1 Effect” is leading to an increase in specific electrical energy consumption (in this case: approx. 19 kWh/t increase). But this effect can be minimized. A definition of taking respective measures will be done by BSE – supporting the client with vast process know how and services.
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Since 1983, the Badische Stahl-Engineering GmbH (BSE) has been acting as a service provider for increasing the efficiency and productivity in the electric steel industry worldwide.

BSE is a sister company of the Badische Stahlwerke GmbH (BSW), one of the world’s most efficient Electric Arc Furnace steel plants.

This unique partnership between BSW and BSE ensures that all products and services provided by BSE are not just based on mere theory, but on more than 4 decades of own proven operational experience.

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