BSE BADISCHE STAHL-ENGINEERING GMBH Excellence Story

Using the Latest Electrode Arm Technology together with Finite Network Method

EAF Modernisation at Arkansas Steel Associates (USA)

In November 2015, BSE successfully installed the latest and most advanced equipment at Arkansas Steel Associates (ASA) in Newport, AR.

Project Approach

BSE previously commissioned successfully a TempSamp Manipulator at ASA in 2009, since then ASA and BSE had a very close relationship.

In 2014, ASA was asking to find a custom-made solution for their non-sturdy superstructure, as the project was jointly defined. It became clear that it was also necessary to upgrade other components at the EAF. The goal was a higher reliability and more power input in order to reach the highest possible productivity.

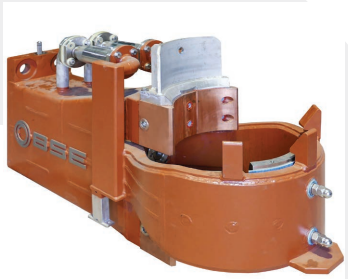
Scope of Supply

The conventional bus-type arms had to be replaced by the new innovative BSE current conducting Arms, together with new columns, state-of-the-art roller guides and the mentioned superstructure.

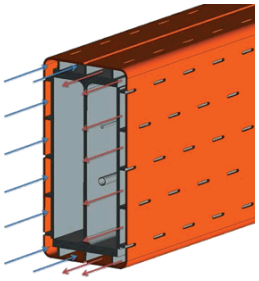
The main challenge of the project was initially the project time of less than nine months. BSE delivered the entire detail engineering in consideration of all local circumstances and with the aim to design a reliable and top performing furnace. State-of-the-art electrode lifting cylinders and the electrode guiding system were delivered by BSE. The manufacturing of the other equipment was made under the customer's scope in North America and Europe.

New Electrode Arms

BSE developed a new design for conductive electrode arms with a steel body and flanged holder.



New BSE design for electrode arms with copper and steel

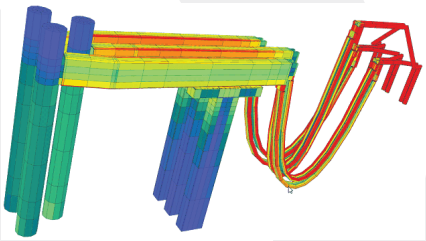


Cooling water flowing inside the gap between steel and copper

The BSE design does not rely on copper plating, but on a separate copper shell that surrounds the steel body with a gap. The copper shell is suitably welded to the steel body.
The advantage of this design is the very direct and homogenous cooling of the current-carrying copper surface. Due to the high copper thickness of 10 mm, the current flow is optimised and the resistance is lower than with the conventional design. Furthermore, the negative impact from the "skin effect" is reduced to its minimum. On a conventional arm the currents tend to go to the corners, but with this new design the corners are round and bent (not welded anymore). From the maintenance perspective, the arm is easy to repair in case of arcing, because it can be patched (welded) with a standard copper sheet. So far, at none of the installations has this been necessary.

Application of FNM

To calculate the perfect power input design matching to this furnace, BSE used the new Finite Network Method.



Extremely inhomogeneous current density distribution prior to the modernisation

Results / Benefits

The project implementation was done within 14 days of stoppage.
Also the operating results are excellent with the new copper / steel electrode arms. At ASA the bus tube arms with a long phase 2 have been exchanged by the new BSE design simulated with FNM beforehand. ASA reports an increase in power input by 1 MW on average and an improved power factor. Congratulations to ASA and thanks again for the great project!

Installation of components at ASA site

Contact:
Patrick.Hansert@bse-kehl.de
Phone 001-704-315-4311

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Badische Stahl-Engineering GmbH
Robert-Koch-Straße 13
D-77694 Kehl/Germany
Phone (+49) 7851/877-0
Fax (+49) 7851/877-133
eMail info@bse-kehl.de
www.bse-kehl.de

BSE America
1811 Sardis Road North, Suite 210
Charlotte, NC 28270
Phone (704) 553-1582
www.bse-america.com

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