

**EDITORIAL**

Dear valued friends,

Especially in today’s tough market situation, stagnation means regress. Being competitive today and in the future requires a sound business philosophy and a consequent investment strategy based on facts.

On the one hand, state-of-the art equipment and continuous process improvement are essential, see our recent hardware projects at BSW and in Turkey or our latest product developments. On the other hand, investing properly means also taking care of environmental aspects, such as emission control. But even the best machines and processes are worthless without motivated and skilled people – one integral part of the Badische philosophy and driving force for all our consulting services, including the BSE Academy, providing various open courses in 2014.

Our Best Practice study uses a database of real, anonymous steel plant data, hence it is an ideal tool to visualise your position in the steel market and helps to derive the right strategy in terms of people and technology.

With the best wishes.

Yours,

J. Greinacher, T. Rummler

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“Anyone who stops improving has stopped being good!”

New annual production record at BSW – Further investment and hardware projects to secure BSW’s leading position in productivity and efficiency in the future

The headlining quote by Robert Bosch (German entrepreneur and founder of the global player Robert Bosch company) is also a permanent stimulation and secret of success for the Badische group with its main steel production facility BSW and engineering company BSE in Kehl/Germany. Despite achieving a new annual production record of more than 2.3 million tons of good billets in 2013, it is not the time to relax and enjoy the success. Beside continuous training of people and process optimisation, BSW also in 2013 invested in major hardware projects done in a close partnership with BSE in order to be competitive today and in the future.

**New LF#1**

After successful installation of a new LF for line #2 in 2012 and its smooth operation since, BSW decided to replace the existing LF#1 within its known limitations by applying the same technical solution of an inverted gantry (see BSE Newsletter 2|2012). The mutual project comprised the engineering and “turn key” supply of the complete ladle furnace and its integration into existing automation.

**Upgrade EAF#1**

BSE was entrusted with the task of replacing the gantry at EAF#1 that had become worn-out after more than 40 years. In the course of the replacement, the new gantry has been relocated to allow an increased tapping weight and roof lifting. Furthermore, a set of aluminium electrode arms with flanged head was installed, capable to be equipped with electrodes of 600 mm diameter, the same size as used at EAF#2.

**Upgrade off-gas system**

In order to cope with BSW’s production targets, the existing off-gas system was upgraded as well, with BSE being responsible for engineering and project management. In addition to the increased numeric dedusting capacity, the off-gas systems of both EAF’s are now separated from each other, thus both EAF’s can be operated independently from each other, for example in case of radioactive contamination.
Increasing efficiency at today’s EAF and providing flexibility for use at future EAF

Successful installation of entire BSE Chemical Energy System at Koç Çelik steel plant in Osmaniye / Turkey

In June 2013, Koç Çelik Sanayi A.Ş. awarded BSE with a project featuring the supply of a BSE Chemical Energy System consisting of Virtual Lance Burners and CarbJets for side-wall / EBT injection as well as a Lance Manipulator for injection of oxygen and carbon from the slag door.

Project targets
The new system should contribute to achieve today’s operational targets in terms of productivity increase with low consumption figures, yet providing flexibility for the initiated increase of furnace size from 60 tons today up to 100 tons in the future. Beside a considerable increase of overall efficiency, the Lance Manipulator at the slag door should take over the dangerous and exhausting task of manual injection by the operators.

Scope of supply
The project included the following hardware and software supply:
- 4 Virtual Lance Burners (VLB) with gas as fuel; 3 VLB’s mounted in side wall, 1 VLB mounted in EBT area
- 2 CarbJets®; mounted in side wall and EBT area
- Lance Manipulator; 2 lances for oxygen and 1 lance for carbon injection
- Valve racks for oxygen (one combined rack for LM and VLB) and natural gas
- Automation for the new system integrated into existing HMI and electrical infrastructure; including TopArc® visualisation tool with steel liquid detection and arc (in-)stability indication

Results / Benefits
In October 2013, after a project time of only 4 months, the complete system was successfully put into operation.

With the new system the tasks of the Koç Çelik operators have changed drastically from manual injection to convenient and precise operation in the control room. Therefore, in the course of the start-up, BSE conducted specific training for the operators as well as for maintenance personnel.

Equally important as the smooth project execution and improvement of working conditions for the operators has been the development of operational results with the newly installed system: With a decrease of power-on time by 2 minutes, resulting in 1-2 additional heats per day, and a decrease of electrical consumption by 20 kWh/t, the performance has fully come up to Koç Çelik’s expectations. These good results were achieved with only three of the four installed VLB’s running and a reduced oxygen injection rate due to currently limited oxygen availability. The fourth VLB will be activated with the start-up of the new furnace.

Use at future EAF
All equipment and auxiliaries were configured for optimum performance for the existing furnace size of 60 tons. But since Koç Çelik intends to invest in a new 100 tons furnace with the same door centreline as today, the injection tools, auxiliaries and automation were also designed for most efficient usage at the new furnace.

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Successful BSE product development based on continuous enhancement and operational experience at BSW steel plant

New design of LM lance feeding unit / New copper current conducting electrode arm with holder / Tiltable Virtual Lance Burner

Beside the new BSE MultiROB (see BSE Newsletter 2|2013) several products have been developed by BSE/BSW in the course of the recent hardware projects. The newly designed lance feeding unit for BSE Lance Manipulators, the new copper-steel electrode arm and the tiltable Virtual Lance Burner are just three of many examples for continuous enhancement resulting from operational experience at BSW. Tested and proven in one of the world’s most productive steel plant, these products will certainly improve the performance in your steel plant, too!

New design of lance feeding unit

The new design of the lance feeding unit features a revised exterior as well as interior. The following amendments are driven by the management’s objective to further improve reliability, availability and maintainability, yet most of them are based on the valuable feedback of operating and maintenance personnel:

- Better view of the furnace door area for operators
- Less water-cooled parts further increase reliability and decrease maintenance
- Less slag splashing on water-cooled front and casing due to reduced contact surface
- Less dust and slag particles in casing due to deflection through side openings
- Less heat radiation on motor due to relocation to the back of the lance head

In December 2013, at a first stage the lance manipulator at EAF#1 was equipped with one new lance feeding unit. Considering the smooth operation and promising results since, it is very likely that the remaining lances will soon be equipped with the new feeding unit, too.

New electrode arm

BSE and BSW mutually developed a new electrode arm design with the aim to further improve efficiency along with a reduction of manufacturing and maintenance efforts. It features a core-superstructure of steel for the electrode supporting arm. The conducting part, the casing, is made out of edge copper plates instead of copper-plated steel. This design allows for a direct cooling of the copper mantle and less welding effort. At a first stage one phase at BSW EAF#1 was equipped with the new arm.

Tiltable VLB

This new development by BSE features a VLB case that is tiltable, allowing for oxygen injection at different angles according to process stage. More detailed information about the tiltable VLB will be published soon.

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Smart modelling helped in finding out the right measures and preventing expensive mistakes

Fluid Dynamic Model Studies executed for customers using different steel-making equipment

The simulation of the in-shop environment and dust and heat distribution using a Plexiglas replica of the meltshop in the Physical Fluid Dynamic Model helps steel plants to understand and improve the building ventilation and working environment. The FDM study executed by BSE subsidiary Bender Corporation (BCI), provides an efficient, cost effective solution for more than 50 customers worldwide. The following projects executed in 2013 show the capability of the FDM study to be implemented to a big variety of applications:

Uddelholm (EAF)

Uddelholm AB is a producer of high quality tool steel bars operating a 70 tons EAF at its meltshop in Hagfors / Sweden. Beside an already modified bag house system, Uddelholm is planning to extend the existing casting bay as a preliminary step for the installation of a second ladle furnace. Based on this new situation, Uddelholm wanted to conduct a FDM study in order to see the impact of these changes on the building ventilation and to check if the existing bag house capacity is sufficient to provide a good building ventilation.

In 2008, Uddelholm had conducted a FDM study with BCI. Hence, the existing model could be re-used for the new project with only minor modifications. During several tests at BCI, Uddelholm representatives were able to check the required roof exhaust capacity, determine the ideal location of auxiliary equipment and find out further measures to improve the building ventilation, e.g. modification of hoods, installation of the tapping sheds and partition walls. Like all models, the Uddelholm FDM is stored in BCI’s facility and can be re-used at any time to check in advance the impact of future equipment rearrangement on the building ventilation, thus providing a cost and time saving solution.

Höganäs (EAF)

Höganäs Sweden AB operates a 50 tons EAF at its meltshop in Halmstad / Sweden. During the years, production capacity has been increasing. Therefore, the existing emission control system capacity became inadequate and needs to be upgraded. Höganäs asked BSE/BCI to conduct a FDM study of the complete meltshop in order to determine the required exhaust capacity and building modifications in order to improve the building ventilation and to define a step-wise implementation of the required modifications.

The model test for BOF plant

The FDM tests determined the required exhaust capacity for each emission source. The detailed recommendations how to modify the existing equipment and the existing operations were developed as the outcome of the study, such as closed door operation in certain process stages or installation of local suction hoods. Many of the recommended equipment modifications were rather small, but implemented together they proved to be very effective.

BOF plant

BSE/BCI recently conducted a comprehensive FDM study for a BOF plant equipped with three BOF’s. The intention of the FDM study was to improve performance of the BOF primary and secondary emission control system, to control the emissions from the hot metal mixer, the ladle cleaning or skimming station and the ladle furnace. In order to have a clear and complete picture, the FDM study was conducted for the BOF emission control system and the local evacuation system for all auxiliary emission sources.

The most important task for every model is to properly simulate the present situation. This challenge was mastered for this project. With Höganäs representatives being convinced of the model validity, many tests were mutually performed and the following modifications determined:

- Increase of canopy exhaust flow rate
- Installation of partition walls
- Eliminate the use of single cooling jets and transformer cooling fans

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Where is your position in the steel industry? We show it to you and help you to reach the identified potentials

**BSE Best Practice Study and Efficiency Consulting**

The World Steel Association expects a 3% to 4% growth in finished steel consumption; nevertheless the market will remain challenging in 2014 due to ever rising energy rates and fluctuation of raw material prices. Therefore, efficiency and continuous improvement becomes even more important in order to successfully compete in such environment. The BSE Best Practice Study compares steel plants and rolling mills from all over the world in order to find the best performers, e.g. per region or steel quality. It is the ideal tool to compare the performance of your facilities with the industry standard and best performers in order to identify potentials for improvement.

**Best Practice Study**
The classic and proven concept of the Best Practice Study is to gather key figures related to both, productivity and cost management in a database in order to compare those with different plants in a confidential and anonymous way. BSE has been executing the Best Practice Study for more than 10 years. The database comprises real data of more than 150 plants (EAF based melt shops and long product rolling mills) worldwide from 100% scrap charge up to DRI or hot metal charge and/or different steel grades produced. There are many BSE clients who participate every year in order to compare annual improvement of their facilities with the development of the industry and/or the Best Practice leaders. This exercise helps to focus on the right areas in order to become or remain competitive.

The idea of Best Practice is to cover every important aspect of successful steel operations. Beside considering productivity and cost management the ‘soft factors’ like people management and environmental aspects are also taken into account.

**Efficiency Consulting**
Achieving cost reduction, productivity increase and a better market position. It is comparatively easy to identify these typical efficiency targets resulting from benchmarking studies. The harder part is to derive and define concrete measures as well as to implement these measures in the plant. Since the 1980’s, BSE consulting services have been covering also the latter part and helping many steelmakers to reach new levels of efficiency by transferring its know-how based on operational experience/development of an own steelmaking plant and relying on true steelmakers as consultants.

How to participate
BSE will provide you free-of-charge with a first, rough analysis of your position in the steel industry and general potentials for improvement. BSE guarantees strict confidentiality, with all analyses being anonymous, only indicating the companies’ continent and type of produced steel grade.

Just fill in and send us back the questionnaire and confidentiality agreement, to be downloaded at our website in the section Downloads/Questionnaires.

www.bse-kehl.de

Achieving impressive figures and optimum operational efficiency...

... with BSE steelmaking consultants having an eye on detail and becoming a part of the customer’s steelmaking team

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We look forward to welcoming steelmakers to conferences / exhibitions, seminars and courses for an exchange of valuable experience

Preview of events and BSE Academy course programme for 2014

In 2014, beside participation in major steelmaking exhibitions and conferences, BSE will host several regional seminars. Furthermore, the successful BSE Academy will offer a big variety of open courses on specific steelmaking topics. We will keep your companies informed about future events taking place in your region or potentially matching your interest and look forward to welcoming you to one of the following events:

Conferences / Exhibitions

Whether meeting us at our booth or listening to BSE lectures at conferences, it is always an interesting communication and exchange of experience from steelmaker to steelmaker:

- **CONAC Steel** in Monterrey (Mexico); March 23-26; Booth no 303
- **Journées Sidérurgiques Internationales** in Paris (France); April 7-8
- **AISTech** in Indianapolis (United States of America); May 5-8; Booth no 914
- **Iron & Steel Symposium Turkey** in Izmir (Turkey); May 22-23
- **SEAISI Exhibition & Conference** in Kuala Lumpur (Malaysia); May 26-29

Communicating from steelmaker to steelmaker at BSE booth

BSE Regional seminars

The structure of BSE regional seminars (one day presentations and one day individual questions & answers), the contents (covering specific customers’ needs and challenges of the region) as well as the sound mixture of participants from different companies have been resulting in many informative and enjoyable events.

You can find the latest information about upcoming events, including papers to be presented by BSE and registration for the regional seminars, at our website in the section Events:

www.bse-kehl.de

Participants of the 2013 BSE regional seminar in Thailand

BSE presentation at an event in China

BSE Academy courses

The 2014 programme of the BSE Academy features courses with various steelmaking topics for different skill and hierarchy levels. Apart from the acquired know-how, the course participants also appreciate and benefit from the exchange of experience with the participants from different companies.

- **April 7-11**
  Dedusting Principles for Steel Plants
- **May 12-14**
  Safety Workshop – a Practical Approach
- **September 23-25**
  Preventive Maintenance in EAF
- **October 6-10**
  Rolling mill Equipment and Maintenance
- **October 20-24**
  Environmental Workshop
- **November 10-12**
  Process Metallurgy
- **November 17-21**
  Rolling Process and Technologies for Long Products
- **November 24-27**
  EAF Electrics for Electricians

Outlines of each course and detailed information on how to register can be found at our website:

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