Dear valued friends,

BSE has the pleasure to conduct the 5th International Mini-Mill Symposium in June 2013. The Symposium stands under the motto “Excellence in Steelmaking 2.0”, which reflects the long-lived steelmaking excellence of our Badische group and the general trend towards a global, interacting steelmaking community.

Carrying-on BSE’s unique approach of combining day-to-day steelmaking experience at BSW and applying this know-how for other steel plants, BSE has extended its product portfolio by hands-on operational and maintenance services conducted by BSW personnel at customer site and directly at BSW (see page 1).

Have a look at BSE’s variety of tailor-made education & training services as well as seminars at the BSE Academy on page 2.

Furthermore, we are proud to present you on the following pages two further successful examples of how efficiency improvement goes hand in hand with safety and environmental compliance.

We wish you a successful year 2013 and look forward too seeing you at our Symposium.

Yours,

J. Greinacher, T. Rummler

Excellence in Steelmaking 2.0

... marks a new dimension in successful steel production. Steelmakers from all over the world have become a global steelmaking community accepting the challenges of the future together: market & strategy, efficiency, ecology and human resources.

From June 9 to June 12, 2013, BSE will host the 5th International Mini-Mill Symposium in Schluchsee / Germany, providing an ideal platform to experience this steelmaking community and to network with colleagues from all around the globe.

The Mini-Mill Symposium is an invitation-only event. If you would like to get more information about this event respectively receive an invitation, feel free to contact us by E-Mail or phone. Please note that the registration period for the Mini-Mill Symposium ends on 31st of March 2013.

We would be glad to welcome you to this informative as well as entertaining event.

For over 45 years, BSW has been producing steel and is today a benchmark for highly productive, efficient and environment-friendly steelmaking. For almost 30 years, BSW experts have been successfully accompanying BSE projects, thus implementing their day-to-day steelmaking know-how and proven methods at customer steel plants all over the world. The success of this unique approach initiated BSE to found Badische Technology & Services, which is specialised in the execution of hands-on operational and maintenance services by BSW personnel at customer site and directly at BSW.

BTS, under the roof of BSE, provides various hands-on services as executed in everyday work during production at BSW. Services can be provided in cooperation with BSE and all Badische companies:

- **Operational training** onsite at the customer and/or at BSW facilities
- **Maintenance / shutdown** planning, organisation and optimisation
- **After-sales services for BSE products**, from repair to modernisation
- **Safety** in practice in the plant

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Providing education & training services from steelmaker to steelmaker

BSE education & training projects – Review 2012 and open courses program for 2013

Customised training and classic seminars at BSW
BSE’s proven concept of classic seminars and customised training for all hierarchical levels is to transfer practical knowledge as a combination of class room training and on-site investigation at the facilities of BSW. Small and effective training/seminar groups guarantee the greatest impact on the participants as well as providing intense and direct contact to the trainer and peer group. The show-how and motivational effect achieved in the training/seminars also helps to create a cultural change within the customer’s organisation.

In 2012, BSE successfully conducted various seminar and training projects, e.g.:  
- Operation & maintenance seminar (AL EZZ DEKHEILA STEEL CO./EGYPT)  
- Process engineer development program (SAUDI BASIC INDUSTRIES CORPORATION/KINGDOM OF SAUDI ARABIA)  
- Junior executive training program (HAI KWANG ENTERPRISE/TAIWAN)  
- Management seminar (REPUBLIC STEEL/USA)  
- Power-off time reduction training (GERDAU AZA/CHILE)

Open courses at BSE Academy
The BSE Academy, founded in 2010, provides open courses from steelmaker to steelmaker. The courses take place all year round with specific subjects on specific dates and are aimed at broadening the experience of people in different operation fields. Managers may know how to lead people and business processes, but often the link to the steelmaking operation is missing. The BSE Academy closes this gap as well as the gap between general theoretical training (college) and training on specific equipment (manufacturer).

Have a glance at what the open courses program for 2013 has to offer:

<table>
<thead>
<tr>
<th>Month(s)</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 8-12</td>
<td>Rolling mill equipment and maintenance</td>
</tr>
<tr>
<td>April 22-26</td>
<td>Environmental workshop</td>
</tr>
<tr>
<td>May 14-16</td>
<td>Preventive maintenance in EAF</td>
</tr>
<tr>
<td>October 7-9</td>
<td>Process metallurgy</td>
</tr>
<tr>
<td>November 25-29</td>
<td>Management training for high potentials</td>
</tr>
</tbody>
</table>

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Technical assistance at customer plants
Like seminars and open courses, the technical assistance at customer plants is also executed by BSE/BSW experts. Their improvement ideas and methods do not come from the drafting board, but from decades of continuous improvement on a daily basis at BSW plus extensive in-depth knowledge of the steel industry adopted by BSE. The scope of work ranges from giving technical advice on specific processes, supporting the implementation of operation or maintenance standards and conducting predefined on-site training activities.

The following extract of technical assistance projects in 2012 gives an idea about the variety of offered services and topics:

- Maintenance downtag planning (REPUBLIC STEEL/USA)
- Technical assistance EAF safety (HELENIC HALYOURGIA/GREECE)
- Technical assistance hot billet charging (GERDAU AZA/CHILE)
- Technical assistance EAF optimisation (ÇOLAKOĞLU/TURKEY)

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„Safety first“ – followed by huge productivity increase later

Increase of productivity at Perwaja (Malaysia) by upgrading of TSM+ into fully functional LM.2 and effective process consulting

Initial installation of TSM+ (2008)
In order to mainly increase safety, in September 2008, Perwaja installed two special BSE Temperature and Sampling Manipulators (TSM+), which could later be upgraded to a Lance Manipulator type 2 (LM.2), at its two 75 tons DC EAFs (DC#4 and DC#5) in Kemaman / Malaysia.

Upgrade of first TSM+ into LM.2 (2012)
In 2012, being at the next phase to improve productivity respectively operation of the process, Perwaja decided to implement a new oxygen tool by upgrading the existing TSM+ at DC#5 into a complete LM.2 for injection of oxygen and carbon from the slag door.

Results / Benefits
In July 2012, the equipment was successfully commissioned and installed at Kemaman site. The smooth start-up was followed by a joined process optimisation by Perwaja team as well as one BSE metallurgist and one BSW EAF supervisor, who stayed at site for some extra days. Optimising the existing side wall oxygen tools and using the new LM.2, under consideration of the entire process, the results were quite stunning:
- Power-on time: –7.4 min
- Oxygen consumption: -4.5 Nm³/t
- Electrical consumption: -81 kWh/t
- DRI feeding rate: +9 t/h

Installation of DC-Online furnace monitoring (2012)
In addition to the upgrades of the TSM+, BSE also installed at DC#4 the DC-online furnace monitoring system replacing the old PlusArc system. Various functions, such as easy detection of deviations of the operating points from the set-points, enable Perwaja to further optimise the operating profile, active power input, power-on time, electrical consumption, panel lifetime and roof lifetime on a sustainable base.

Upgrade of second TSM+ into LM.2 (2013)
The successful installation of the LM.2 and process optimisation at DC#5 convinced Perwaja to upgrade also the TSM+ at DC#4 within shortest possible time. Hence, BSE was awarded with the upgrade project. The start-up is scheduled for beginning of 2013.

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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 (AMI GE) 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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