Refractory Technology

Applications, Wear Mechanism and Failures

26th to 29th April 2020
Cologne | Germany

TARGET GROUP
Maintenance and operating personnel, supervisors responsible for plant and unit operations, and managers responsible for decisions on refractory problems will learn about new materials and installation methods. Refractory installers, third party inspectors and contract maintenance personnel will particularly benefit from detailed discussions on new installation techniques and materials.

DIRECTED BY
Dr. Andreas Buhr, Frankfurt

REGISTRATION FEE / REMARKS
EUR 990,00* registration fee VAT-free plus
EUR 312,00 conference package (total EUR 1.302,00*)
EUR 1.190,00 registration fee VAT-free plus
EUR 312,00 conference package (total EUR 1.502,00)

* for employees of member companies and individual members of the Steel Institute VDEh, and for scientific staff of universities
The conference package includes food and beverages during the seminar (incl. 19 % VAT).

A free withdrawal from the seminar is possible until 2 weeks prior to the start. Then, 25% of the seminar fee must be paid.

The total registration amount will be charged for no show or cancellation from the first day of the event. The participant resp. his company also has to bear the cancellation costs of the seminar hotel.

Note: Both during lectures and discussions, as well as in the breaks of the seminar, our guidelines on adherence to cartel-law regulations shall be followed.

CONTENT
▪ Steel manufacturing process
▪ General overview of wear mechanisms and methods for examination of the refractory material after use
▪ Refractory lining and wear mechanism of blast furnace, taphole, and runners
▪ Refractory lining and wear in the torpedo ladle
▪ Process conditions affecting the refractory lining life and the development of refractory materials technology in oxygen blowing converters
▪ Steel Teeming Ladle: ladle metallurgical treatment, refractory stress, materials and lining concepts
▪ Challenges and solutions for continuous casting refractories in consideration of clean steel, automation and economy
▪ Refractory lining and wear of AC and DC furnaces
▪ Economics in refractory usage
▪ Team-work on failure case studies

ORGANISATION
Stahl-Akademie / Steel Academy • Stahlinstitut VDEh
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VENUE / SEMINAR HOTEL
Leonardo Royal Hotel Köln Am Stadtwald
Dürrener Str. 287
50935 Köln
Germany

The Steel Academy will automatically make a room booking for the participants at the Leonardo Royal Hotel Cologne from 26 to 29 April 2020 for a special rate of EUR 99,00/night incl. breakfast. The hotel room bill will be settled by you upon departure. Please advice at registration, if you do not need a reservation or whether you would like to stay longer in the hotel. The participant resp. his company has to bear the cancellation costs of the seminar hotel.
**PROGRAMME**

**Sunday, 26th April 2020**

16:00  **Introduction**  
Andreas Buhr  
Participants can present their failure cases and the according information material, so that they can be included in the team work on failure cases

16:30  **Steel Manufacturing Process**  
Andreas Buhr

17:30  **GENERAL OVERVIEW of Wear Mechanisms, Methods for Examination of the Refractory Material after Use**  
Rinus Siebring  
Chemistry, physics, mineralogy, procedure and evaluation: wear mechanisms, types of damages, description of optional research methods to examine the wear mechanism, typical failures of refractory material after the operational application, evaluation of the samples

19:00  **Common Dinner**

**Monday, 27th April 2020**

08:30  **Refractory Lining and Wear Mechanism of BLAST FURNACE, Taphole, and Runners**  
Stephan Clasen  
Lining concepts considering furnace dimensions, cooling and investment costs. Refractories for furnace shaft and hearth, wear mechanism. Intermediate repair techniques to extend furnace campaign. Development of tapping technique, requirements on taphole mixes and materials used. Performance criteria on lab and practical scale

10:30  **Coffee Break**

11:00  **ECONOMICS in Refractory Usage**  
Rinus Siebring  
Including Team Work Economics

13:00  **Common Lunch**

14:00  **TEAM WORK – Introduction and Failure Case Studies, Part I**

15:00  **Refractory Lining Life and the Development of Refractory Materials Technology in OXYGEN BLOWING CONVERTERS, Part I**  
Michael Berger / Jochen Schlüter  
Development of LD process, combined blowing process, use of sublance, purpose of bottom stirring, re-blowing/ direct tappin. Charge materials: hot metal; scrap; fluxes/additives. Development in the refractory materials sector, trends and philosophies. Process models and process sequences. Wear mechanism, development and adaptation of lining concepts, counteractions in the refractory materials area and detection of wear. Maintenance and care (until 18:30, incl. short break)

16:00  **Coffee Break**

16:30  **Refractory Lining Life and the Development of Refractory Materials Technology in OXYGEN BLOWING CONVERTERS, Part II**  
Michael Berger / Jochen Schlüter

19:00  **Common Dinner**

**Tuesday, 28th April 2020**

8:30  **STEEL TEEMING LADLE: Ladle Metallurgical Treatment / Refractory Stress / Materials and Lining Concepts, Part I**  
Hans Schröter / Andreas Viertauer  
Secondary metallurgy: metallurgical tasks, different ladle treatments and different ladle slag, homogenisation. Steel teeming ladle: refining concepts, wear mechanism, refractory lab tests, drying and heating, laser based measurement to determine the residual thickness, ladle stirring, problem areas and safety precautions

10:00  **Coffee Break**

10:30  **STEEL TEEMING LADLE, Part II**  
Andreas Viertauer / Hans Schröter

12:00  **Common Lunch**

13:00  **TEAM WORK – Failure Case Studies, Part II**

15:00  **Coffee Break**

15:30  **Refractory Lining and Wear of AC and DC FURNACES**  
Leandro Schöttler  
Influences on the wear, comparison AC and DC furnaces, different kinds of lining, refining hearth and sidewalls between the heats

17:00  **Short break**

17:15  **Inspection of refractory lining by means of 3D-laserprofile measurement**  
Rolf Lamm

18:00  **TEAM WORK – Failure Case Studies, Part III**  
(if necessary)

19:00  **Common Dinner**

**Wednesday, 29th April 2020**

8:30  **Challenges and Solutions for CONTINUOUS CASTING Refractories in Consideration of Clean Steel, Automation and Economy Part I**  
Georg Krumpel / Sven Karrasch  

10:00  **Coffee Break**

10:30  **Challenges and Solutions for CONTINUOUS CASTING Refractories in Consideration of Clean Steel, Automation and Economy Part II**  
Georg Krumpel / Sven Karrasch

12:00  **Common Lunch**

13:00  **Discussion of Team Work: Results on Failure Case Studies**  
Andreas Buhr

15:00  **Discussion**

15:30  **Closing Remarks**

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**SPEAKERS:**  
Dipl.-Ing. Michael Berger, RHI Magnesita, Wien  
Dr. rer. nat. Andreas Buhr, Almatis GmbH, Frankfurt  
Dr. Stephan Clasen, Hüttenwerke Krupp Mannesmann GmbH, Duisburg  
Dipl.-Ing. Sven Karrasch, thyssenkrupp Steel Europe AG, Duisburg  
Georg Krumpel, RHI Magnesita, Leoben  
Rolf Lamm, Minteq International GmbH, Duisburg  
Dipl.-Ing. Jochen Schlüter, SMS Mevac GmbH, Essen  
Georg Krumpel, RHI Magnesita, Leoben  
Ir. Rinus Siebring, Tata Steel Research and Development, Ijmuiden  
Ing. Andreas Viertauer, RHI Magnesita, Wien