Stahlinstitut VDEh

Stahl-Akademie

Online Seminar / Live Stream

Secondary Metallurgy of Steel

8-10 December 2021,
each 8.30 a.m. to 13.00 p.m. CET

Chairman

Dr.-Ing. Helmut Lachmund, DILLINGER

Online Seminar Concept

Technical quality

The Steel Academy attaches great importance to the audio-visual quality of its online seminars. This seminar will be broadcast as a live-stream from Steel Academy's film studio in Dusseldorf – with high quality camera, microphone and lighting. In the picture will be shown the speaker and his presentation. A moderator leads through the seminar programme.

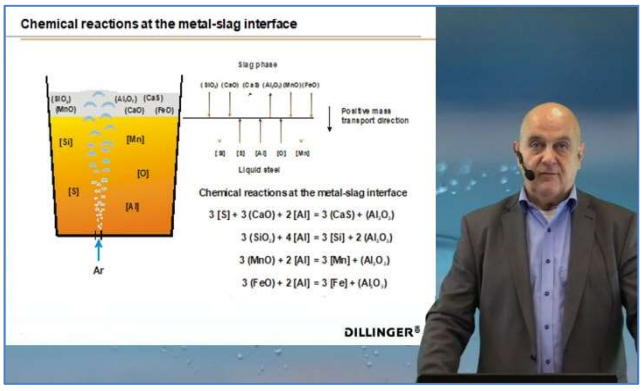

Photo: Chairman Dr. H. Lachmund during an online lecture at Steel Academy's studio

Online seminar - how does it work?

- 2-3 days before seminar's starting you receive an e-mail with a link and a password
- the link leads you to the streaming platform vimeo.com
- you log in with the password

⇨ we recommend using earphones, LAN or good WLAN

Schedule

3 days, 4,5 hours from 08.30 a.m. to 1.00 p.m. CET Berlin time

Seminar handouts

Before seminar's starting the participant can download the presentations as a pdf

Content

- Overview: Tasks of modern secondary metallurgy
- Materials technology's impact on process metallurgy
- Chemistry crash course: How to read phase diagrams
- Thermodynamic and kinetics for secondary metallurgy
- Fluid dynamics in the ladle
- Kinetics of special reactions in secondary metallurgy
- Deoxidation
- Calcium metallurgy
- Metallurgy of the ladle furnace
- Metallurgy of ladle tank degassing
- Metallurgy of RH degassing
- Metallurgy of VOD and AOD process
- Special melting processes, especially ESR

Organisation

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Target Group

- Steel shop operating staff
- Steel shop maintenance staff
- Steel shop installers
- Steel shop operation managers
- Engineers interested in cleanliness of steel

Registration Fee

€ 640,00* // € 690,00 VAT-free

* for employees of member companies and individual members of the Steel Institute VDEh. Scientific staff of universities gets a 50 % off. Also 50 % discount for each additional participant from the same company. Cancellation free of charge is not possible after receiving of the log-in data.

+++ as part of the VDEh youth development sponsorship also young engineers (up to 35 years) of member companies receive a 50% discount +++

PROGRAMME

WEDNESDAY, 8 DEC 2021

8.30 a.m. **Introduction**
Peter Schmieding

8.45 a.m. **Overview: Tasks of secondary metallurgy**
Helmut Lachmund
Basic operations of secondary metallurgy / Plants and processes / Maximum contents of accompanying elements

9.15 a.m. **Trends in materials technology and their impact on process metallurgy**
Wolfgang Bleck
Crystallography / Microstructure, phase transformations / Accompanying elements / Relationship between chemical composition, microstructure and mechanical properties

10.15 a.m. questions & answers

10.30 a.m. **Chemistry crash course: How to read phase diagrams**
Helmut Lachmund

10.45 a.m. **Thermodynamic and kinetic fundamentals for secondary metallurgy**
Karl-Heinz Spitzer
Complex equilibria / Gibbs energy / Heat-, massm and momentum flow densities / Transport equations for heat, mass and momentum / Turbulent transport

11.45 a.m. questions & answers

12.00 a.m. **Fluid dynamics in the ladle**
Jens Kempken / Frank Ahrenhold
Momentum-, buoyancy- and energy flow in fluid mechanics / Axially symmetric free jets / Energy dissipation and turbulence / Mixing and dissolution

1.00 p.m. questions & answers
=> afterwards: end of 1st day

THURSDAY, 9 DEC 2021

8.30 a.m. **Kinetics of special reactions in sec. metallurgy**
Jens Kempken / Frank Ahrenhold
Degradation curves and mass transfer / Aluminium melting loss / Marangoni effect / Kinetics of deoxidation

9.00 a.m. questions & answers

9.15 a.m. **Deoxidation**
Helmut Lachmund
Deoxidation equilibria / Nucleation and growth / Coagulation / Deposition / Oxide metallurgy

10.15 a.m. questions & answers

10.30 a.m. **Calcium metallurgy**
Helmut Lachmund
Fundamentals of calcium metallurgy / Inclusion modification / Operational application

11.30 a.m. questions & answers

11.45 a.m. **Metallurgy of the ladle furnace**
Jens Apfel
Plant technology / Components and necessary peripherals / Heating rate / Buffering / Metallurgical possibilities / LF heat balance

1.00 p.m. questions & answers
=> afterwards: end of 2nd day

FRIDAY, 10 DEC 2021

8.30 a.m. **Metallurgy of ladle tank degassing**
Helmut Lachmund
Plant design and process engineering / Vacuum deoxidation / Decarburisation / Denitrification / Hydrogen decomposition / Metal-slag reactions / Slag emulsification / Reactions with refractory materials / Stirring strategy

9.30 a.m. questions & answers

9.45 a.m. **Metallurgy of RH degassing**
Thomas Eichert
Variants of RH treatment: Vacuum carbon deoxidation, natural and forced decarburisation / Plant design / Treatment process and cycle times / Comparison of ladle tank degassing and RH process

10.45 a.m. questions & answers

11.00 a.m. **Metallurgy of VOD and AOD processes**
Leandro Schöttler
Thermodynamics and kinetics / Vacuum generation and vacuum control / Layout of VOD lances / Exhaust gas analyses and process modelling / Duplex and triplex processes

11.45 a.m. questions & answers

12.00 a.m. **Special melting processes, especially ESR**
Leandro Schöttler / Alexander Scheriau
Reactions, solidification, ingot defects and plant concepts for electroslag remelting

1.00 p.m. questions & answers
=> afterwards: end of seminar

SPEAKERS Dr.-Ing. Frank Ahrenhold, thyssenkrupp Steel Europe AG, Duisburg ▪ Dr. Jens Apfel, Primetals Technologies Germany GmbH, Willstätt-Legelshurst ▪ Prof. Dr.-Ing. Wolfgang Bleck, RWTH Aachen ▪ Dipl.-Ing. Thomas Eichert, SMS Group GmbH, Düsseldorf ▪ Dr.-Ing. Jens Kempken, SMS Group GmbH, Düsseldorf ▪ Dr.-Ing. Helmut Lachmund, AG der Dillinger Hüttenwerke, Dillingen ▪ Dipl.-Ing. Alexander Scheriau, INTECO melting and casting technologies GmbH, Bruck a.d. Muhr ▪ Dipl.-Ing. Leandro Schöttler, DEW Specialty Steel GmbH & Co. KG, Witten ▪ Prof. Dr.-Ing. Karl-Heinz Spitzer, TU Clausthal ▪ Organisation: Peter Schmieding, Stahl-Akademie, Stahlinstitut VDEh, Düsseldorf