



Online Seminar / Live Stream

Secondary Metallurgy of Steel

7 - 9 November 2022, each 8.30 a.m. to 1.30 p.m. CET



CHAIRMAN

Dr.-Ing. Helmut Lachmund

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.

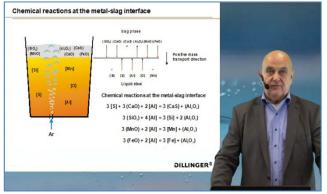


Photo: Chairman Dr. H. Lachmund during an online lecture at Steel Academy's studio tu-

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, 5 hours from 08.30 a.m. to 1.30 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

Monday, 7 Nov 2022

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

11.00 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

12.00 a.m. questions & answers

12.15 a.m. Fluid dynamics in the ladle

Jens Kempken

Momentum-, buoyancy- and energy flow in fluid mechanics / Axially symmetric free jets / Energy dissipation and

turbulence / Mixing and dissolution

1.30 p.m. questions & answers

=> afterwards: end of 1st day

TUESDAY, 8 Nov 2022

8.30 a.m. Kinetics of special reactions in sec. metallurgy

Jens Kempken

Degradation curves and mass transfer / Aluminium melting

loss / Marangoni effect / Kinetics of deoxidation

9.15 a.m. questions & answers

9.30 a.m. **Deoxidation**

Helmut Lachmund

Deoxidation equilibria / Nucleation and growth / Coagulation / Deposition / Oxide metallurgy

10.45 a.m. questions & answers

11.00 a.m. Calcium metallurgy

Helmut Lachmund

Fundamentals of calcium metallurgy / Inclusion modifica-

tion / Operational application

12.00 a.m. questions & answers

12.15 a.m. Metallurgy of the ladle furnace

Benjamin Kradel

Plant technology / Components and necessary peripherals / Heating rate / Buffering / Metallurgical possibilities /

LF heat balance

1.30 p.m. questions & answers

=> afterwards: end of 2nd day

WEDNESDAY, 9 Nov 2022

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 / Reac-

tions 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

12.00 a.m. questions & answers

12.15 a.m. Special melting processes, especially ESR

Leandro Schöttler / Alexander Scheriau

Reactions, solidification, ingot defects and plant concepts

for electroslag remelting

1.30 p.m. questions & answers

=> afterwards: end of seminar

SPEAKERS Prof. Dr.-Ing. Wolfgang Bleck, RWTH Aachen • Dipl.-Ing. Thomas Eichert, SMS Group GmbH, Düsseldorf • Dr.-Ing. Jens Kempken, SMS group GmbH, Düsseldorf • Benjamin Kradel, Primetals Technologies Germany GmbH, Willstätt • Dr.-Ing. Helmut Lachmund, 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, Steel-Academy, Steel Institute VDEh, Düsseldorf