



# Online Seminar / Live Stream

# Ironmaking

Basic course: 4-5 May 2021 Advanced course: 8-9 June 2021 each at 12.30 p.m. to 5.30 p.m. CET Berlin

### **TECHNICAL CHAIRMEN**

Prof. Dieter Senk / Prof. Peter Schmöle

### **ONLINE SEMINAR CONCEPT**

The Steel Academy attaches great importance to the audiovisual quality of its online seminars. This BF 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 – like in a TV news program.

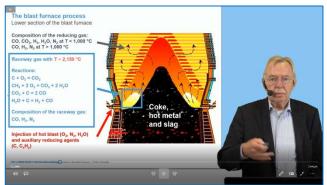


Photo: P. Schmöle during an online lecture at Steel Academy's studio

#### Online seminar - how does it work?

- 2-3 days before seminar's starting the participant receives 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/headphones and LAN connection or good WLAN

#### Schedule

(2 x) 2 days, each day 5 hours, 12.30 p.m. till 5.30 p.m. CET

#### Seminar handouts

2-3 days before seminar's starting the participant can download the presentations as a pdf

#### Note

Cancellation free of charge is not possible after receiving of the log-in data and the presentations



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#### **CONTENTS** (separate booking possible)

#### **Basic Course**

- · Crash course: Materials chemistry
- Blast furnace layout
- · Resources, types and characteristics of iron ores
- · Agglomeration of fines: Sintering and pelletizing
- · Cokemaking and requirements on coke
- · Chemical and physical processes in the blast furnace
- Application of reducing agents
- Blast furnace performance

#### **Advanced Course**

- Operational practices and challenges
- · Hearth and deadman dynamics
- Modelling and simulation
- · Injection of carbon-hydrogen carriers into the BF
- · Various BF operation modes worldwide
- · Energy network in integrated iron and steel works
- · Quality and use of blast furnace slags
- Environmental protection
- · Direct reduction and hydrogen-based reduction

## TARGET GROUPS

BF operating and maintenance staff / Supervisors responsible for decisions on metallurgy and energy / Raw material and purchasing staff / Mining staff

## **ORGANISATION & REGISTRATION**

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#### **REGISTRATION FEE**

1 module: Both modules:

€ 540,00\* // € 590,00 VAT-free € 900,00\* // € 990,00 VAT-free

\* for employees of member companies and individual members of the VDEh. scientific staff of universities gets a 50 % off. Also 50 % discount for each additional participant from the same company.

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

# PROGRAM



## Module 1: FUNDAMENTAL COURSE

## Tuesday, 4 May 2021

12.30 p.m.	Introduction to the course - Peter Schmieding
12.45 p.m.	Crash-course: Materials chemistry Dieter Senk Thermodynamical equilibria / Phase diagrams / System Fe-C-O <sub>2</sub> / Slag diagrams
2.15 p.m.	<b>Blast furnace layout</b> Hans Bodo Lüngen BF design and construction / Refractories / Inner zones
3.00 p.m.	Resources, types and characteristics of iron ores Rénard Chaigneau Resources and deposits / Types and grades of ores
4.00 p.m.	Agglomeration of fines: Sintering and pelletizing Dieter Senk Sintering, pelletizing, mixing

#### 5.30 p.m. End of 1<sup>st</sup> day (module 1)

## Wednesday, 5 May 2021

12.30 p.m.	Coal, cokemaking and requirements on coke Peter Liszio Coal / Cokemaking process / Demands on coke quality
1.45 p.m.	Chemical and physical processes in the BF Peter Schmöle Process diagrams / Heat and mass balances / Gas flow / Flow of liquids / Cohesive zone / Deadman / Coke quality
3.15 p.m.	Application of reducing agents Alexander Babich Coke, coal, plastics, biomass, hydrogen-containing gases / Gasification mechanisms and rates / Injection technology
4.30 p.m.	Blast furnace performance Peter Schmöle BF operation modes / Carbon consumption and CO <sub>2</sub> - emissions / Productivity / Top gas energy
5.30 p.m.	End of 1 <sup>st</sup> module

# Module 2: ADVANCED COURSE

## Tuesday, 8 June 2021

12.30 p.m.	Introduction to the course - Peter Schmieding
12.45 p.m.	Hearth and deadman dynamics Robert Nightingale Deadman dynamics / Floating or sitting? / Sensing dead- man condition / Coke quality issues / Deadman renewal
2.00 p.m.	Modelling and simulation Alexander Babich Options and limits / Programs in use and development
3.15 p.m.	Operational practices and challenges Maarten Geerdes The burden / Burden descent / Circumferential symmetry / Tuyeres / Stops and starts
4.45 p.m.	Injection of carbon-hydrogen carriers into the BF Peter Schmöle Hydrogen input with hot blast, coke and auxiliary reducing agents / Effects on blast furnace operations
5.30 p.m.	End of 1 <sup>st</sup> day (module 2)
Wednesday, 9 June 2021	
12.30 p.m.	Various BF operation modes worldwide Hans Bodo Lüngen / Peter Schmöle
1.15 p.m.	Energy network in integrated iron & steel works Hans Bodo Lüngen / Peter Schmöle Use of process gases in integrated iron and steel works / Energy recovery and use
2.00 p.m.	Quality and use of blast furnace slags Dieter Senk Slag formation & control/ Slag application / Heat recovery
3.15 p.m.	Environmental protection Jens Traupe Environmental regulations / Classic environmental protec- tion / Blast furnace and climate change / Carbon2Chem
4.15 p.m.	Direct reduction and hydrogen-based reduction Hans Bodo Lüngen Midrex / Energiron HyL / Hydrogen-based reduction
5.30 p.m.	End of seminar

**SPEAKERS** Dr.-Ing. Alexander Babich, Department of Ferrous Metallurgy, RWTH Aachen University Dr. ir. Rénard Chaigneau, Baffinland Iron Mines Europe B.V., Amsterdam Dr. Maarten Geerdes, Geerdes Advies, Castricum Dipl.-Ing. Peter Liszio, thyssenkrupp Steel Europe, Duisburg Dr.-Ing. Hans Bodo Lüngen, Steel Institute VDEh, Düsseldorf Dr. Robert Nightingale, Sydney Prof. Dr.-Ing. Peter Schmöle, DPS Consulting, Dortmund Univ.-Prof. Dr.-Ing. Dieter Senk, Department of Ferrous Metallurgy, RWTH Aachen University Dr. Jens Traupe, Salzgitter AG, Salzgitter