

Online-Seminar / Live Stream

Electrical Engineering of Arc Furnaces

6-8 October 2021

at 8.30 a.m. till 1 p.m. CET Berlin



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CHAIRMAN

Prof. Dr.-Ing. Klaus Krüger,
General Manager Stahlwerk Annahütte

ONLINE SEMINAR CONCEPT

Technical quality

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

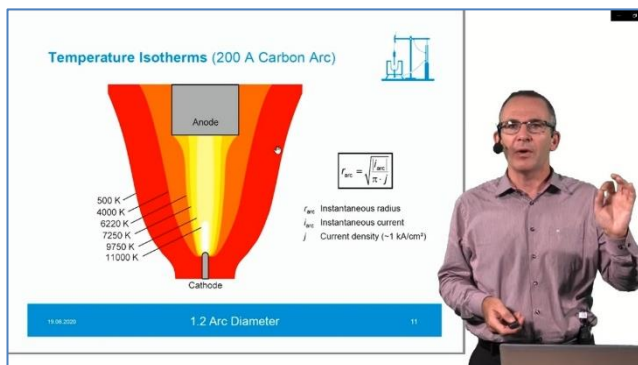


photo: Klaus Krüger during an online lecture at Steel Academy's studio

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, 5 hours from 8.30 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

PROGRAM

- Role and importance of the EAF in the hydrogen strategies
- Physics of furnace arcs
- Equivalent circuit diagram of AC-furnaces
- Short circuit and operating reactance
- Circle diagram of AC-furnaces
- Design of the high-current system for AC-furnaces
- Electrical layout of AC-furnaces
- Energy balance of the EAF
- Melting of DRI and HBI in the EAF
- Energetic modelling of the EAF process
- Closed loop power control of AC-furnaces
- Power supply for Electric Arc Furnaces
- Electric principles of DC-furnaces
- Which one is better? Comparison AC - DC

← new

← new

← new

TARGET GROUP

- EAF operating staff
- EAF maintenance staff
- Steel shop installers
- Steel shop operation managers

REGISTRATION

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PRICE

€ 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 +++

PROGRAM

Wednesday, 6th of Oct, 2021

- 8.30 a.m. **Introduction**
Peter Schmieding
- 8.45 a.m. **Welcoming and introduction**
Peter Schmieding & Klaus Krüger
- 9.00 a.m. **Physics of AC and DC arcs**
Klaus Krüger
Arc length / Steel bath impression / Arc characteristic / Instantaneous voltage and current / Arc deflection
- 10.00 a.m. **questions and answers**
- 10.15 a.m. **Equivalent circuit diagram of AC-EAF**
Klaus Krüger
Single phase and three phase circuit-diagram / Complex variables / Vector diagrams / Short circuit reactance
- 11.00 a.m. **questions and answers**
- 11.15 a.m. **Short circuit and operating reactance**
Klaus Krüger
Two and three phase short circuit test / Shift of the neutral point / Model and effect of the arc reactance
- 12.00 a.m. **questions and answers**
- 12.15 p.m. **Design of the AC high-current system**
Markus Abel
Transformer pins / Flex-strips / Connection through transformer wall / Power cables / Electrode arms
- 1.15 p.m. **questions and answers**
=> afterwards: end of 1st day

Thursday, 7th of Oct, 2021

- 8.30 a.m. **Circle and furnace power diagram of AC-EAF**
Klaus Krüger
Calculation of circle and furnace power diagram
- 9.30 a.m. **questions and answers**
- 9.45 a.m. **Electrical layout of AC-EAF**
Markus Abel
Different electrical designs for various charge materials (scrap, hot metal, DRI) and for various grades of steel
- 10.45 a.m. **questions and answers**

- 11.00 a.m. **Energy balance of the EAF**
Thomas Echterhof
Energy consumption / Efficiency / Sankey diagram of the EAF / Energy recovery / Scrap preheating
- 12.00 a.m. **questions and answers**
- 12.15 p.m. **Melting of DRI and HBI in the EAF**
Markus Abel
Energy consumption / Efficiency / Sankey diagram of the EAF / Energy recovery / Scrap preheating
- 1.15 p.m. **questions and answers**
=> afterwards: end of 2nd day

Friday, 8th of Oct, 2021

- 8.30 a.m. **Power supply of EAF and requirements for the supply network**
Detmar Arlt
Influence of the power supply network of arc furnaces / Network disturbances / Reactive power compensation
- 9.15 a.m. **questions and answers**
- 9.30 a.m. **Closed loop power control of AC-furnaces**
Klaus Krüger
Control variables and control strategies of electrode position controls / Thermal based power control / Closed-loop reactor control
- 10.30 a.m. **questions and answers**
- 10.45 a.m. **Energetic modelling of the EAF process**
Bernd Kleimt
Model-based analysis of the energetic efficiency of EAF / Dynamic modelling of energy and mass balance / Online calculation of the melt temperature
- 11.30 a.m. **questions and answers**
- 11.45 a.m. **Electric principles of DC-furnaces**
Klaus Krüger
System design / Rectification / Power diagram / Closed-loop current and voltage control / Arc deflection
- 12.45 p.m. **questions and answers**
- 1.00 p.m. **Which one is better? Comparison AC – DC**
Klaus Krüger
- 1.30 p.m. **end of seminar**

SPEAKERS Dipl.-Ing. Markus Abel, tripleS GbR, Durbach ▪ Prof. Dr.-Ing. Detmar Arlt, University of Applied Sciences Duesseldorf ▪ Dr.-Ing. Thomas Echterhof, RWTH Aachen University ▪ Dr.-Ing. Bernd Kleimt, VDEh-Betriebsforschungsinstitut BFI, Duesseldorf ▪ Prof. Dr.-Ing. Klaus Krüger, Stahlwerk Annahütte, Freilassing // Organisation: Peter Schmieding, Steel Academy, Duesseldorf