Steel Academy’s
15th international Seminar on

Electrical Engineering of Arc Furnaces

9 - 11 March 2020, Cologne, Germany

TARGET GROUP
Leading experts will present basic principles and new technologies of electric steelmaking for maintenance and operating personnel, supervisors responsible for plant and unit operations and managers. Steelshop installers, third party inspectors, and contract maintenance personnel will particularly benefit from detailed discussions on new developments and techniques.

CHAIRMAN
Prof. Dr.-Ing. Klaus Krüger, Max Aicher GmbH & Co. KG

PROGRAMME
Physics of Furnace-Arcs • Equivalent Circuit-Diagram of AC-Furnaces • Short Circuit and Operating Reactance • Circle Diagram of AC-Furnaces • Power Supply and Requirements of the Supply Network • Furnace Transformers • Design of the High-current System for AC-Furnaces • Electrical Layout of Electric Arc Furnaces • Energy Balance of the Electric Arc and the Arc Furnace • Graphite Electrodes for EAFs • Static Var Control • Power Control of AC Arc Furnaces • Electric Principles of DC-Furnaces • Energetic Modelling of the Electrical Arc Furnace Process • Foaming Slag Control • Tutorial: Calculation of EAF circle diagrams

SPEAKERS
Dipl.-Ing. Markus Abel, tripleS GbR, Durbach • Prof. Dr.-Ing. Detmar Artt, University of Applied Sciences Düsseldorf • Dipl.-Ing. Arne Arnold, Showa Denko Carbon Germany GmbH, Meitingen • Andreas Dulzky, INTECO melting and casting technologies GmbH, Bruck a. d. Mur • Dr.-Ing. Thomas Echterhof, RWTH Aachen University • Dipl.-Ing. Egon Kirchenmayer, Siemens AG, Nürnberg • Dr.-Ing. Bernd Kleimt, VDEh-Betriebsforschungsinstitut BFI, Düsseldorf • Prof. Dr.-Ing. Klaus Krüger, Max Aicher GmbH & Co. KG // Organisation: Peter Schmieding, Steel Academy, Duesseldorf

ORGANISATION / REGISTRATION
Steel Academy
Steel Institute VDEh
Mr Peter Schmieding
Sohnstraße 65 • 40237 Düsseldorf, Germany
Tel +49 (0)211 6707-458 • Fax -655
info@steel-academy.com, www.steel-academy.com

VENUE / SEMINAR HOTEL
art’otel Cologne
Holzmarkt 4
50676 Cologne, Germany

The Steel Academy will automatically make a room booking for the participants at the art’otel Cologne from 8 (evening prior to the seminar’s beginning) to 11 March 2020 for a special rate of EUR 101,00 per night incl. breakfast. The hotel room bill will be settled by you upon departure. Please advise at your registration, if you do not need a reservation or whether you would like to stay longer in the hotel.

PRICE
€ 1,222,00* (€ 990* registration fee VAT-free plus € 232 conference package/full board)
€ 1,422,00 (€ 1,190 registration fee VAT-free plus € 232 conference package/full board)

* for employees of member companies and individual members of the Steel Institute VDEh

The conference package includes food and beverages during the seminar.
A free withdrawal from the seminar is possible until two 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 also has to bear the cancellation costs of the seminar hotel.
MONDAY, 9th of March, 2020

08:30  Welcoming and Introduction  
       Peter Schmieding

09:30  Physics of Furnace Arcs  
       Klaus Krüger  
       Arc length and diameter / Steel bath impression / Arc characteristic / Instantaneous voltage and current / Arc deflection

10:30  Coffee Break

11:00  Equivalent Circuit-Diagram of AC-Furnaces  
       Klaus Krüger  
       Single phase and three phase circuit-diagram / Application of complex variables / Vector diagrams / Short circuit reactance

12:15  common lunch

13:30  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

14:30  Circle Diagram of AC-Furnaces  
       Klaus Krüger  
       Calculation of circle and furnace power diagram

15:30  Coffee Break

16:00  Power Supply of Electric Arc Furnaces and Requirements of the Supply Network  
       Detmar Arlt  
       Influence of the power supply network of arc furnaces / Network disturbances / Reactive power compensation

at the same time:  Tutorial: Calculation of Circle Diagrams of DC-Furnaces

19:00  common dinner

TUESDAY, 10th of March, 2020

08:30  Furnace Transformers  
       Egon Kirchenmayer  
       Basic principles of a transformer / Furnace transformer with direct regulation / Booster-transformer / Voltage drop / Influence of the transformer- and system-impedances / Limits of voltage and power

10:15  Coffee Break

10:45  Design of the high-current System for AC Furnaces  
       Markus Abel  
       Transformer pins / Flex-strips / Connection through transformer wall / Power cables / Electrode arms

11:45  Electrical Layout of AC Furnaces  
       Markus Abel  
       Different electrical designs for various charge materials (scrap, hot metal, DRI) and for various grades of steel (carbon/stainless)

13:00  common lunch

14:15  Energy Balance of the Electric Arc  
       Thomas Echterhof  
       Electrical efficiency / Heat transfer from the arc to the melt / Energy balance of the electric arc / Parameters of the heat transfer / Fluid flow in slag and melt

15:15  Energy Balance of the Electric Arc Furnace  
       Thomas Echterhof  
       Energy consumption / Efficiency / Sankey diagram of the EAF / Energy recovery / Scrap preheating

16:15  Coffee Break

16:45  Foaming Slag Control  
       Klaus Krüger  
       Effect of foaming slag / Possibilities of automated foaming slag detection and control

17:30  Static Var Control for Electric Arc Furnaces  
       Detmar Arlt  

at the same time:  Tutorial: Calculation of Circle Diagrams of DC-Furnaces

19:00  common dinner

WEDNESDAY, 11th of March, 2020

08:30  Graphite Electrodes for Electric Arc Furnaces  
       Arne Arnold  
       Production, properties, current carrying capacity and handling of electrodes / Recent and future developments

09:15  Energetic Modelling of the Electrical Arc Furnace Process  
       Bernd Kleimt  
       Model-based analysis of the energetic efficiency of Electric Arc Furnaces / Dynamic modelling of energy and mass balance / Online calculation of the melt temperature

10:30  Coffee Break

11:00  Ladle Furnaces  
       Andreas Dulzky  
       Electrical layout / System design / Applications

12:00  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

13:30  common lunch

14:15  Electric Principles of DC-Furnaces  
       Klaus Krüger  
       System design / Rectification / Power diagram / Closed-loop current and voltage control / Arc diversion

15:30  End of the Seminar