


Bardolino . Italy . 16-18 October 2024

European Coke and Ironmaking Congress

COAL, COKE, BIOCOAL, BIOCOKE, BIOCHAR AND IRON REDUCTION

Final Programme

Organised by

ASSOCIAZIONE ITALIANA DI METALLURGIA

www.aimnet.it/ecic





TIMETABLE

Wednesday 16 October 2024		
08:00	Registration	
	GARDENIA ROOM	IRIS+LILIUM ROOM
09:00	**OPENING SESSION**	
10:50	Coffee break	
11:15	**H2 and Syngas exploitation I**	**Sintering and Pelletizing I**
13:00	Lunch	
14:00	**H2 and Syngas exploitation II**	**Sintering and Pelletizing II**
15:20	Coffee break	
15:45	**CO2 mitigation including CCUS**	**Cokemaking I**
19:00	Welcome reception	
Thursday 17 October 2024		
08:30	**Direct reduction and smelting reduction I**	**Sintering and Pelletizing III**
10:30	Coffee break	
10:55	**Direct reduction and smelting reduction II**	**Blast furnace ironmaking - equipment I**
13:00	Lunch	
14:00	**Direct reduction and smelting reduction III**	**Cokemaking II**
14:40		**Blast furnace ironmaking - operations I**
15:40	Coffee break	
16:00	**Direct reduction and smelting reduction IV**	**Blast furnace ironmaking - operations II**
19:30	Conference dinner	
Friday 18 October 2024		
08:30	**Blast furnace ironmaking - operations III**	**Measuring Technologies and Industry 4.0 I**
10:10	Coffee break	
10:35	**Biocoal | biochar**	**Measuring Technologies and Industry 4.0 II**
11:20		**Blast furnace ironmaking - equipment II**
13:20	**Closing remarks**	

SCOPE and BACKGROUND

AIM is glad to announce the 9th European Coke and Ironmaking Congress (ECIC) to be held in Bardolino, Italy, on 16–18 October 2024.

ECIC 2024 will focus on the newest technologies in coke making, sintering, pelletizing, pyrolyzing the biomasses and ironmaking (blast furnaces, direct reduction and carbon–based smelting processes).

The 2050 goal of carbon neutrality and the related intensive efforts of the steel industry will significantly affect the technologies for iron ore reduction. In this perspective, the shortage of iron ores matching the requirement for direct reduction by gas and for melting in electric arc furnace makes important proposal of new technologies and devices that can ensure the carbon neutrality even for the coal based routes.

This Congress will focus on technologies that can achieve such a goal improving the efficiency of the existing process, applying the devices that avoid a net emission of green house gases and to point out new routes based on exploitation of biomasses whose net emission is intrinsically neutral.

BACKGROUND

The Coke and Ironmaking events started separately as the European Ironmaking Congress (EIC) in 1986 in Aachen, Germany, and in 1991 in Glasgow, Scotland, and as the International Cokemaking Congress (ICMC) in 1987 in Essen, Germany, and in 1992 in London, England.

The merger of these two events took place in 1996 as the European Coke and Ironmaking Congress (ECIC) in Gent, Belgium.

1st EIC – Aachen, 1986
1st ICMC – Essen, 1987
2nd EIC – Glasgow,1991
2nd ICMC – London, 1992
3rd ECIC – Gent, 1996
4th ECIC – Paris, 2000
5th ECIC – Stockholm, 2005
6th ECIC – Düsseldorf, 2011
7th ECIC – Linz, 2016
8th ECIC – Bremen, 2022

COMMITTEES

CONGRESS CHAIRPERSONS

Prof. Carlo Mapelli – Politecnico di Milano, Italy
Prof. Johannes Schenk – Montanuniversität Leoben, Austria

SCIENTIFIC AND STEERING COMMITTEE

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Martin Gantenberg – Paul Wurth, Luxembourg
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Reinoud van Laar – Danieli Corus, Netherlands
Olena Volkova – Institute for Iron and Steel Technology, TU Bergakademie Freiberg, Germany

ORGANISING COMMITTEE

Federica Bassani – Associazione Italiana di Metallurgia, Italy
Sabrina De Donato – Associazione Italiana di Metallurgia, Italy
Carlo Mapelli – Politecnico di Milano, Italy
Silvano Panza – Associazione Italiana di Metallurgia, Italy

ORGANISING SECRETARIAT

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Wednesday 16 October 2024
Gardenia room

8:00 Registration of attendees

9:00 **OPENING SESSION**
Welcome addresses by
Silvano Panza – AIM President
Johannes Schenk, Carlo Mapelli – Conference Chairpersons

9:20 [ecic_097] **The way the European steel industry wants to become carbon neutral**
H. B. Lüngen – Germany
P. Schmöle – Germany

9:50 [ecic_114] **Iron ore for direct reduction: future challenges and solutions**
C. Barrington – International Iron Metallics Association, United Kingdom

10:20 [ecic_115] **Hydrogen perspectives in iron and steelmaking**
C. Mapelli – Politecnico di Milano, Italy

10:50 **Coffee break**

Wednesday 16 October 2024
Gardenia room

Session H2 AND SYNGAS EXPLOITATION I

CHAIRPERSONS: **ANDRÉ OUDHUIS – MICHAEL ZARL**

11:15 Keynote [ecic_094] **Hydrogen ironmaking to decarbonise the steel industry. Fundamentals and current progress**
F. Patisson, O. Mirgaux – University of Lorraine, France

11:40 [ecic_081] **Influence of hydrogen injection on basic iron ore sinter reduction at blast furnace center conditions**
A. Abdelrahim, A. Koskela, M. Iljana, T. Fabritius – University of Oulu, Finland
C. van der Kroon. V. Pridhivi – Tata Steel Europe, Netherlands

12:00 [ecic_090] **Circular ironmaking: transforming byproducts into DRI with hydrogen reduction**
M. Leuchtenmüller – Montanuniversität Leoben, Austria

12:20 [ecic_104] **On the influence hydrogen-bearing injected fuels in the ironmaking blast furnace**
S. Nielson, T. Okosun, O. Ugarte, C. Q. Zhou – Purdue University Northwest, USA
K. Leontaras, J. Entwistle – US Steel, USA

12:40 [ecic_116] **Hydrogen production technology from solid-oxide electrolysis using waste heat from the ironmaking process**
Y. Yang, H. Kim, J. S. Ahn – POSCO N.EX.T Hub, Korea

13:00 **Lunch**

Wednesday 16 October 2024
Iris+Lilium room

Session SINTERING AND PELLETIZING I

CHAIRPERSONS: **MAGNO RIBEIRO - YAOZU WANG**

11:15 Keynote [ecic_058] **Influence of metallic iron structure and molten slag formation on softening behavior of pre-reduced pellets under high temperature loading condition in inert atmosphere**
K-i. Ohno, T. Kon – Kyushu University, Japan
T. Orimoto, N. Yasuda – Nippon Steel Corporation, Japan

11:40 [ecic_016] **T Atomic-scale structural analysis of calcium ferrite in sintered ore by scanning transmission electron microscopy**
K. Takehara, K. Ikeda, T. Kawano, T. Higuchi – JFE Steel, Japan

12:00 [ecic_002] **Effects of gradual substitution of coke breeze with charcoal on the sinter process**
J. Eisbacher-Lubensky, F. Kittinger, S. Pichler, C. Weiß – Montanuniversität Leoben, Austria
H. Stocker, S. Wegscheider – voestalpine Stahl Donawitz, Austria

12:20 [ecic_079] **Revealing the softening and melting behavior of sinters and lump ores under a real blast furnace working line by analyzing the quenched burdens**
W-c. Tsai, Y-n. Chiu, K-c. Chang, K-c. Hsieh, S-k. Lin – National Cheng Kung University, Taiwan
P-c. Cheng – National Cheng Kung University, Taiwan and China Steel Corporation, Taiwan
J-S. Shiau – China Steel Corporation, Taiwan
H-l. Chen – National Pingtung University of Science and Technology, Taiwan

12:40 [ecic_069] **Investigate effects of sintering condition on the agglomeration behavior of iron ore sinter with high SiO_2 content**
P.-c. Cheng – National Cheng Kung University, Taiwan and China Steel Corporation, Taiwan
K-c. Chang, S-x. Liu, K-c. Hsieh, S-k. Lin – National Cheng Kung University, Taiwan
J-s. Shiau – China Steel Corporation, Taiwan

13:00 **Lunch**

Session H2 AND SYNGAS EXPLOITATION II

CHAIRPERSONS: HAMZAH ALSHAWARGHI – REINOUD VAN LAAR

14:00 [ecic_026] **Production of hot hydrogen-rich syngas in integrated plants for efficient injection in the blast furnace and CO2 mitigation (ProSynteg)**
E. L. Faraci, M. Gili, D. Ressegotti – Rina–Centro Sviluppo Materiali, Italy
D. Garot – CRM asbl, Belgium
A. Oblanca Gutiérrez – ArcelorMittal, Spain
C. Morelli, L. Micheletti – Paul Wurth Italia, Italy

14:20 [ecic_110] **CO_2-free hydrogen production technology from ammonia/methane using direct reduced iron**
S. Joo, G. Kwon, C. H. Rhee, B-S. Kim, Y. Yang, H. W. Park – POSCO N.EX.T Hub, Korea

14:40 [ecic_077] **Influence of a higher hydrogen based reduction share from coke oven gas injection on the blast furnace process**
H. Bartusch, T. Hauck – VDEh-Betriebsforschungsinstitut, Germany
F. Demirci, A. Janz – Hüttenwerke Krupp Mannesmann, Germany

15:00 [ecic_100] **The pyrolysis of natural gas as a source of hydrogen and carbon**
G. Dall'Osto, C. Mapelli, D. Mombelli, S. Bazri – Politecnico di Milano, Italy
M.M.S. Tommasini, A. Lucotti – Università di Perugia, Italy

15:20 **Coffee break**

Session SINTERING AND PELLETIZING II

CHAIRPERSONS: KO-ICHIRO OHNO - JAN EISBACHER-LUBENSKY

14:00 [ecic_083] **Comparative analysis of different sinter strand modeling techniques in flowsheeting: insights for steelmaking optimization**
A. Walk – Technische Universität Wien, Austria and K1-MET, Austria
B. Weiss – Primetals Technologies Austria, Austria
W. Wukovits – Technische Universität Wien, Austria

14:20 [ecic_084] **Investigating the oxidation behaviour of magnetite ore: impact of particle size fraction and mineralogical composition**
A. Laarich, C. Andersson, H. Ahmed – Lulea University of Technology, Sweden
T.K Sandeep Kumar, D. Marjavaara, K. Wiegel – LKAB, Sweden
S. Richter – Outotec & Co., Germany
J-O. Wikström – Kaunis Iron, Sweden

14:40 [ecic_054] **Development of convergence engineering simulation technique based on the image data obtained by X-ray computed tomography for ironmaking packed bed deformation**
S. Natsui, R. Honda, H. Nogami – Tohoku University, Japan

15:00 [ecic_121] **Reduction of NO and SO2 from the sintering process through the use of new hearth layer materials**
L. Tomas Da Rocha, S. Cho, B-J. Chung, S-M. Jung – POSTECH, Korea

15:20 **Coffee break**

Session CO2 MITIGATION INCLUDING CCUS

CHAIRPERSONS: **YASUSHI SASAKI – JAN VAN DER STEL**

15:45 **Keynote** [ecic_109] **How ironmaking holds the key to the green steel evolution**
T. Hansmann – SMS group, Germany

16:10 [ecic_012] **Options for reducing CO2 emissions for iron and steel plants and energy efficiency considerations**
S. Kumar, Y. Gordon, P. Krawchuk – Hatch, Canada
R. Maia – Hatch, Canada

16:30 [ecic_057] **Integration of carbon capture and utilization process in a steel mill during the transition phase towards net zero emissions**
C. Mühlegger, O. Maier, A. Sasiain Conde – K1-MET, Austria
A. Spanlang, T. Keplinger – voestalpine Stahl, Austria
A. Werner – TU Wien, Austria

16:50 [ecic_067] **Technologies and status of hydrogen, syngas, and carbon capture use in ironmaking**
H. Alshawarghi, J. von Schéele, P. Mathur – Linde, Germany

17:10 [ecic_061] **New ways to harness the CO_2 footprint in sintering**
E. Fehringer, M. Böberl – Primetals Technologies Austria, Austria

17:30 [ecic_085] **Transforming blast furnace into environmentally friendly EASyMelt™ through the utilization of ammonia and carbon capture for achieving net-zero emissions**
F. Mauret, M. Baniasadi, J. Ji, P. Kinzel – Paul Wurth, Luxembourg
H. Saxén – Åbo Akademi University, Finland

17:50 [ecic_127] **Combining processes and technology in an example of a waste processing and steel & cement production facility**
H. Oterdoom – Butterbridge, Netherlands

19:00 **Welcome reception at *La Loggia e la Barchessa Rambaldi***

Wednesday 16 October 2024
Iris+Lilium room

Session COKEMAKING I

CHAIRPERSONS: **ANDREA FABBRI – HANNAH LOMAS**

15:50 [ecic_060] **Effect of coal blending and pretreatment on coke quality and its reactivity**
W-J. Lee, D-M. Jang, J-O. Park, G-H. La – POSLAB, Korea

16:10 [ecic_063] **Measurement and analysis of semi-coke contraction**
S. Khoshk Rish, D. R. Jenkins, A. Tahmasebi – NIER University of Newcastle, Australia

16:30 [ecic_050] **Development of coke structure under stamp charged coking condition**
S. Khoshk Rish, A. Wang, M. Mahoney, A. Tahmasebi – CIMR/NIER University of Newcastle, Australia

16:50 [ecic_055] **Measurement of coke quality**
R. Pearson, D. E. Pearson – Pearson Coal Petrography, Canada

17:10 [ecic_064] **Biocoke under blast furnace atmosphere with increased amounts of hydrogen**
A. Heikkilä, J. Haapakangas, A. Koskela, T. Fabritius – University of Oulu, Finland

17:30 [ecic_082] **High temperature shrinkage measurement development as a tool to extend lifetime of coke ovens**
A. Oudhuis, B. Gols, J. van der Plas, L.J. Pille, P. Put, B. van Vliet – Tata Steel, Netherlands
A. Tahmasebi, S. Khoshk Rish, D. Jenkins - The University of Newcastle (NIER), Australia

17:50 [ecic_111] **Demonstration of CO_2 utilization in ironmaking industries: CO_2 reaction with unused hot carbon in coking chamber**
H. W. Park, S. Joo, B-S. Kim, G. Kwon, C. H. Rhee – POSCO N.EX.T Hub, Korea

18:10 [ecic_036] **Mineral effects on coke performance at high temperatures: reactivity and dissolution**
R. J. Longbottom, B. J. Monaghan – University of Wollongong, Australia

Session DIRECT REDUCTION AND SMELTING REDUCTION I

CHAIRPERSONS: **CHRISTIAN BOEHM - HANGGOO KIM**

8:30 [ecic_045] **The role of Australian iron ores for the green transition**
G. Wimmer, R. Millner, B. Hiebl, Ch. Boehm – Primetals Technologies Austria, Austria

8:50 [ecic_070] **HIsarna for processing almost all waste materials an option for iron making**
J.L.T. Hage, H.K.A. Meijer, J.E.B. Fradet, C. Zeilstra, J.W.K Van Boggelen, J. Van Der Stel – Tata Steel, Netherlands

9:10 [ecic_011] **Green steel and vanadium production in Uzbekistan**
Z. Adilov, T. Kodirov, D. Atakhanov – Enter Engineering, Uzbekistan
M. Bodley, M. Sidawi, S. Thakurdin, Y. Gordon, G. Dressel, S. Kumar – Hatch, Canada

9:30 [ecic_003] **Hy^3 (Hy-CUBE): Hyundai Steel's initiative for carbon avoidance steelmaking**
H. Kim, M. Sun – Hyundai Steel, Korea

9:50 [ecic_024] **Refractory lining challenges in transitioning from established to hydrogen-ready operations in DRI shaft furnace technologies**
D. Gavagnin, E. Kyrilis – RHI Magnesita, Austria
E. J. Estrada Ospino – RHI Canada, Canada
M. Spreij – RHI Magnesita Trading, Netherlands
S. Postrach – RHI Magnesita Sales Germany, Germany

10:10 [ecic_117] **Fe_3C as an alternative iron source to DRI**
Y. Sasaki – Tohoku University, Japan
K. Ikeda, H. Kubo – Fukuoka Institute of Technology, Japan

10:30 **Coffee break**

Session SINTERING AND PELLETIZING III

CHAIRPERSONS: SUNG-MO JUNG – ISMAEL MATINO

8:30 [ecic_098] **Mechanism for iron burden reduction of blast furnace process-a laboratory scale simulation**
Y-j. Kuo, Y-n. Chiu, K-c. Chang, Y-j. Hu, W-c. Tsai, P-c. Cheng, K-c. Hsieh – National Cheng Kung University, Taiwan
J-S. Shiau – China Steel Corporation (CSC), Taiwan
H-l. Chen – National Pingtung University of Science and Technology, Taiwan
S-k. Lin – National Cheng Kung University, Taiwan and China Steel Corporation (CSC), Taiwan

8:50 [ecic_096] **Minimizing environmental impact of pelletizing and direct reduction plants**
T. Steinparzer, T. Plattner, P. Trunner – Primetals Technologies Austria, Austria

9:10 [ecic_033] **Reduction disintegration behavior of self-fluxing pellet at 600°C and 700°C under high hydrogen blast furnace condition**
K. Momma, T. Murakami – Tohoku University, Japan

9:30 [ecic_053] **Mineral phase and structural evaluation of the influence of iron ore concentrate on melting and assimilation phenomena in the sintering process**
S. Yamazaki, T. Adachi, H. Taguchi, K. Koga, K. Miyagawa – Kobe Steel, Japan

9:50 [ecic_052] **The effect of gangue phase existing state on gangue removal behavior in the iron ore upgrading process by reduction-crushing-separation**
T. Adachi – Kobe Steel, Japan

10:10 [ecic_041] **Utilization of biocarbon in iron-ore sintering for CO_2 reduction**
I. Song, Y. Lee, J. Lee – Hyundai Steel, Korea
J. Yoo – Korea Institute of Energy Research, Korea
D. Kim – Wonjin Worldwide, Korea

10:30 **Coffee break**

Session DIRECT REDUCTION AND SMELTING REDUCTION II

CHAIRPERSONS: **CHRIS BARRINGTON - CHRISTIAN BOEHM**

11:00 [ecic_072] **High resolution characterization of DC arc parameters in a Hydrogen Plasma Smelting Reduction furnace**
C. R. Quick, E. Reichel – K1-MET, Austria

11:20 [ecic_013] **The behavior of trace elements in the smelter**
A. Pfeiffer, B. Voraberger, G. Wimmer – Primetals Technologies Austria, Austria

11:40 [ecic_006] **Electric smelting furnace technology and implementation readiness**
K. Chomyn, S. Ge, T. Koehler, C. Walker, D. Rudge – Hatch, Canada

12:00 [ecic_004] **Estimating heat and material balances in direct reduction plants under various operating conditions**
M. Sun, H. Kim – Hyundai Steel, Korea

12:20 [ecic_037] **Smelter - A new Pathway for green iron making**
G. Wimmer, A. Pfeiffer, B. Voraberger – Primetals Technologies Austria, Austria

12:40 [ecic_025] **Quantitative study for COG-based production of DRI of a high carbon content in a fluidized-bed reactor**
J. O. Jo, J. R. Lee – Hyundai Steel, Korea
H. Kim – Pukyong National University, Korea
K. Yoo – Korea Maritime & Ocean University, Korea

13:00 **Lunch**

Session BLAST FURNACE IRONMAKING - EQUIPMENT I

CHAIRPERSONS: **IAKOV GORDON – DAVID ANDREW OSBORNE**

10:55 Keynote [ecic_095] **The grand quest for green steel – It's all about survival**
G. Wimmer – Primetals Technologies, Austria

11:20 [ecic_087] **Material tracking**
C. Dengler, X. Rooss – Paul Wurth, Luxembourg
D. I. Durneata, L. Wu – Rogesa, Germany

11:40 [ecic_074] **37 year campaign of IJmuiden blast furnace 6**
J.R.H. Stuurwold, B. Nugteren, G.J. Tijhuis, F. Kerkhoven – Tata Steel, Netherlands
R. van Laar – Danieli Corus, Netherlands

12:00 [ecic_015] **Method evaluation for understanding the reduction behaviour of cold-agglomerated pellets**
M. Bennett, R. Joyce, P. Warren – Binding Solutions, United Kingdom

12:20 [ecic_059] **Gasification reactivity of coke microtextural constituents to CO_2**
H. Lomas, S. Khoshk Rish, A. Jayasekara, A. Tahmasebi – University of Newcastle, Australia
T. Congo, K. Steel – University of Queensland, Australia

12:40 [ecic_075] **Latest generation dry blast furnace gas cleaning technology: improved energy efficiency and carbon footprint**
P. Klut, J. de Weerdt, G. Bakker – Danieli Corus, Netherlands

13:00 **Lunch**

Session DIRECT REDUCTION AND SMELTING REDUCTION III

CHAIRPERSONS: **LENA SUNDQVIST-ÖQVIST – JOHANNES SCHENK**

14:00 [ecic_038] **Applicability of a laboratory counter-current BORIS reactor to study non-isothermal reduction of iron oxides with hydrogen**
Y. Graz, Y. Maurice, A. Husson, R. Santos Ferreira, O. Nechyporuk, J. Barros Lorenzo – ArcelorMittal Maizieres Research, France

14:20 [ecic_103] **Exploring the effects of lateral hydrogen injection in the hydrogen plasma smelting reduction process**
D. Ernst – Montanuniversitaet Leoben, Austria
M. Farkas, M. Zarl – K1-MET, Austria

14:40 [ecic_092] **Investigation of the behaviour of phosphorus, sulfur and copper during the hydrogen plasma smelting reduction process**
B. Adami – K1-MET, Austria
D. Ernst, J. Schenk – University of Leoben, Austria

15:00 [ecic_113] **Carbon–free electrodes in hydrogen plasma smelting reduction: an innovative approach for low emission steelmaking**
M. Zarl, M. Farkas – K1-MET, Austria
B. Geier - voestalpine Stahl Donawitz, Austria
D. Ernst – Montanuniversitaet Leoben, Austria

15:20 [ecic_021] **Hydrogen based reduction behavior of MgO rich magnetite pellets**
P. Garg, H. Ahmed, C. Andersson – Luleå University of Technology, Sweden
C. Samuelsson – Future Eco North, Sweden
J–O. Wikström – Kaunis Iron, Sweden

15:40 **Coffee break**

Session COKEMAKING II

CHAIRPERSONS: THORSTEN HAUCK - FRANZ REUFER

14:00 [ecic_086] **The role of the coke dry quenching technology in the frame of the transition to the green steel**
A. Fabbri, F. Strobino, R. Calcagno, A. Ferraris – Paul Wurth Italia, Italy

14:20 [ecic_028] **Optimizing coal blending in coke production: A logistic approach**
J. Kim – POSCO Holdings N.EX.T Hub, Korea
D. Jang, H. Jeong, S. Lee – POSCO, Korea

Session BLAST FURNACE IRONMAKING – OPERATIONS I

CHAIRPERSONS: THORSTEN HAUCK - FRANZ REUFER

14:40 [ecic_031] **Innovative ultra low carbon ironmaking technology with massive HBI charging in blast furnace**
M. Yakeya, A. Kasai, M. Sakamoto, T. Tagawa, K. Miyata – Kobe Steel, Japan

15:00 [ecic_088] **Techno-economic assessment of ammonia and HBI as flexible green energy carrier for BF-BOF steel making**
J. Ji, E. Taktak, P. Kinzel, M. Baniasadi, F. Mauret – Paul Wurth, Luxembourg

15:20 [ecic_122] **Coke behavior with H_2O in a hydrogen-enriched blast furnace: A review**
K. Li, F. Zhou – University of Science and Technology Beijing, China
J. Zhang – University of Science and Technology Beijing, China and University of Queensland, Australia

15:40 **Coffee break**

Session DIRECT REDUCTION AND SMELTING REDUCTION IV

CHAIRPERSONS: **VALENTINA COLLA – FABRICE PATISSON**

16:00 [ecic_009] **The Extended Discrete Element Method (XDEM) as a common simulation framework for traditional and green steelmaking**
B. Peters, X. Besseron – University of Luxembourg, Luxembourg

16:20 [ecic_022] **Blast furnace transition towards DRP, CO2 reduction and hydrogen usage in ENERGIRON® plants**
M. Lapasin, D. Pauluzzi, M. Mahmoud – Danieli & C. Officine Meccaniche, Italy

16:40 [ecic_019] **Coolbrook's RotoDynamic Heater™ - electrifying high-temperature process heat and reducing fossil fuel emissions in the steel industry**
T. Paananen – Coolbrook, Finland

17:00 [ecic_044] **Reduction of sinter in hydrogen containing atmosphere**
A. Szemalikowska, M. Niesler, J. Stecko, J. Marcisz, W. Szulc – Łukasiewicz - Górnośląski Instytut Technologiczny, Poland

Session BLAST FURNACE IRONMAKING – OPERATIONS II

CHAIRPERSONS: RAYMOND JAMES LONGBOTTOM - HANS BODO LÜNGEN

16:00 [ecic_046] **The green transformation in the Chinese ironmaking Industry**
J. Zhang – University of Science and Technology Beijing, China and University of Queensland, Australia
K. Li, Z. Liu, T. Yang – University of Science and Technology Beijing, China

16:20 [ecic_051] **Evaluation of the conversion behavior of Alternative Reducing Agents in a test rig under raceway conditions**
T. Nanz, M. Bösenhofer – K1-Met, Austria and TU Wien, Austria
J. Rieger – K1-Met, Austria
H. Stocker – voestalpine Stahl Donawitz, Austria
C. Feilmayr – voestalpine Stahl, Austria
M. Harasek – TU Wien, Austria

16:40 [ecic_005] **Softening and melting behaviour of ferrous burden under simulated blast furnace process conditions**
Y. Xiao, A. Craamer, M. Martinez Pacheco, T. Peters – Tata Steel, Netherlands

17:00 [ecic_023] **CFD investigation of blast furnace raceway: Effect of the co-injection of coke-oven gas (COG) and the injection method in the tuyere level**
A. Islas, M. Baniasadi, P. Goedert, P. Bermes – SMS group (Paul Wurth), Luxembourg
A. Feiterna, D. Durneata – AG der Dillinger Hüttenwerke, Germany
A. Janz, F. Demirci – Hüttenwerke Krupp Mannesmann (HKM), Germany

Session DIRECT REDUCTION AND SMELTING REDUCTION IV

CHAIRPERSONS: **VALENTINA COLLA – FABRICE PATISSON**

17:20 [ecic_034] **First steps in the endeavour to determine particle properties in the direct reduction process of iron ore pellets**
S. La Manna, S. Z. Ajabshir, D. Barletta, M. Poletto – Università di Salerno, Italy
K. Qyteti, V. Scherer – Ruhr-University Bochum, Germany

17:40 [ecic_071] **Influence of some operating parameters on the direct reduction of iron ore by hydrogen in a shaft furnace**
A. Marsigny, O. Mirgaux, T. Quatravaux, F. Patisson – Institut Jean Lamour, France

18:00 [ecic_078] **Simulation of Direct Reduction Processes to be included in a process chain multipurpose simulation toolkit**
I. Matino, V. Colla, A. Vignali – Scuola Superiore Sant'Anna, TeCIP, Italy

18:20 [ecic_042] **Iron ore sintering tests for direct reduction in H_2-containing atmosphere**
A. Szemalikowska, M. Niesler, J. Stecko, J. Marcisz, W. Szulc – Łukasiewicz - Górnośląski Instytut Technologiczny, Poland

19:00 Transfer service departure
19:30 **Conference dinner at *Cantina Monteci***

Thursday 17 October 2024
Iris+Lilium room

Session BLAST FURNACE IRONMAKING – OPERATIONS II

CHAIRPERSONS: **RAYMOND JAMES LONGBOTTOM - HANS BODO LÜNGEN**

17:20 [ecic_039] **Influence of blast furnace technology and design features on heat losses in the cooling system and coke consumption for compensation of them**
O. Chaika, B. Kornilov, A. Moskalyna – National Academy of Sciences of Ukraine (ISI NASU), Ukraine
M. Alter – ALTER Blast Furnace Consulting, USA
V. Naboka, S. Safonov – PJSC "Zaporozhstal" Iron & Steel Works, Ukraine

17:40 [ecic_076] **BF-BOF steelmaking CO_2 emissions reduction options**
R. van Laar, D. Verma, J. de Weerdt – Danieli Corus, Netherlands

18:00 [ecic_119] **Recovery of a blast furnace to normal operation after a "chilled hearth" event**
M. Alter – ALTER Blast Furnace Consulting, USA
O. Chaika – Iron & Steel Institute of National Academy of Sciences, Ukraine

19:00 Transfer service departure
19:30 **Conference dinner at *Cantina Monteci***

Session BLAST FURNACE IRONMAKING – OPERATIONS III

CHAIRPERSONS: GEIER BERNHARD - MATTEO GILI

8:30 [ecic_062] **CO_2 reduction technology through COG injection and low-reduced iron charging to the blast furnace**
J-O. Park, W-J. Lee, G-H. La, Y-S. Lee, S-H. Yi – POSLAB, Korea

8:50 [ecic_029] **Start-up and usage of coke oven gas at HKM on our mission to green steel and CO_2 reduction**
F. Perret, F. Demirci, A. Janz, R. Peter – Hüttenwerke Krupp Mannesmann, Germany
T. Semleit, S. Schulte – thyssenkrupp Steel Europe, Germany

9:10 [ecic_068] **Insights into the segregation in the blast furnace charging system: from the stockhouse to top hoppers**
A. Hadi, Y. Pang, D. Schott – Delft University of Technology, Netherlands
A. Adema, J. van der Stel – Tata Steel Europe, Netherlands

9:30 [ecic_027] **Spotlight on Na2O and K2O behaviour in blast furnace operation**
P. Warren – Binding Solutions, United Kingdom
M. Geerdes – Geerdes Advies, Netherlands

9:50 [ecic_014] **Application of slag model to minimize the end-to-end cost of hot metal production**
Y. Gordon – Hatch, Canada
N. Iziumskiy, G. Matveenko, P. Zhabrovets – Association of Pig Iron Producers, Ukraine

10:10 **Coffee break**

Friday 18 October 2024
Iris+Lilium room

Session MEASURING TECHNOLOGIES AND INDUSTRY 4.0 I

CHAIRPERSON: **HAUKE BARTUSCH**

8:30 [ecic_010] **EMF-timeseries analysis implemented as predictive tool in BF-tapping control**
S. Moll, J. Eisbacher–Lubensky, C. Weiß – Montanuniversität Leoben, Austria
J. Felser – voestalpine Metal Engineering, Austria
G. Lengauer – voestalpine Stahl, Austria

8:50 [ecic_102] **Transparent AI - key element for successful ironmaking process optimization**
D. Bettinger, H. Fritschek, A. Klinger, P. Krahwinkler, M. Schaler, C. Tauber – Primetals Technologies Austria, Austria
C. Feilmayr, C. Staudinger – voestalpine, Austria
M. Schatzl – K1-Met, Austria
R. P. Goldberg – Midrex Technologies, USA

9:10 [ecic_007] **Campaign life extension of COREX furnaces**
W.L. Ying, A. Sadri, Y. Gordon – Hatch, Canada

9:30 [ecic_032] **A soft measurement model construction method based on machine learning and CFD**
Y. Wang, S. Li, J. Zhang, Z. Liu – University of Science and Technology Beijing, China

9:50 [ecic_017] **Integrated steel plants challenges during transition to green steel - a holistic quantitative evaluation of CO2 reduction potentials using digital twins in m.simtop**
B. Weiss, R. Millner, H. Völkl, B. Hiebl – Primetals Technologies Austria, Austria

10:10 **Coffee break**

Session BIOCOAL | BIOCHAR

CHAIRPERSONS: **ANNE HEIKKILÄ – LUCA OREFICI**

10:35 Keynote [ecic_093] **Production of high-quality biocarbon and utilization in the metallurgical industry**
K. Rigas, M. Gemvik, T. Brink – Envigas, Sweden

11:00 [ecic_056] **BioCoDe: biomass for cokemaking decarbonization**
V. Pepe – RINA Consulting-Centro Sviluppo Materiali, Italy
A. Sorino, R. Attrotto, A. Vecchio, G. Fiorenza – Acciaierie d'Italia, Italy

11:20 [ecic_106] **Bio–coke for manganese ferroalloys production - results of the BioCoke4FAI R&D project implementation**
M. Rejdak, A. Sobolewski, M. Wojtaszek-Kalaitzidi, B. Mertas – Institute of Energy and Fuel Processing Technology, Poland
M. Książek – SINTEF, Norway
S. Y- Larsen – Eramet, Norway
P. Szecówka – Koksownia Częstochowa Nowa, Poland

11:40 [ecic_065] **Assessing biochar functionality for EAF use**
G. Seenivasan, A. Andersson, H. Ahmed, L. Sundqvist-Öqvist – Luleå University of Technology, Sweden

12:00 [ecic_080] **Modelling of processes for upgrading biomass before its use in steel industry**
I. Matino, V. Colla, O. Toscanelli – Scuola Superiore Sant'Anna, TeCIP, Italy

12:20 [ecic_040] **Research on the potential role of biocarbon in future ironmaking process**
G. Kim, H. Oh, J. Lee, Y. Lee, Y. Bae, J. cho, J. Kwon, J. Park, J. Lee – Hyundai Steel, Korea

Friday 18 October 2024
Iris+Lilium room

Session MEASURING TECHNOLOGIES AND INDUSTRY 4.0 II

CHAIRPERSON: **CARLO MAPELLI**

10:40 [ecic_048] **Advanced thermal camera technology for tuyere raceway temperature measurement**
P. Warren – Binding Solutions, United Kingdom
I. Scott, S. Ibrahim – Pyroptik, United Kingdom
T. Stoakes – British Steel, United Kingdom

11:00 [ecic_008] **Monitoring strategies for blast furnaces and electric arc furnaces**
W.L. Ying, Y. Gordon, S. Kumar, A. Sadri – Hatch, Canada

Session BLAST FURNACE IRONMAKING – EQUIPMENT II

CHAIRPERSON: **CARLO MAPELLI**

11:20 [ecic_047] **How are Ironmakers investing in existing blast furnace assets?**
D. Osborne, R. Horwood, G. Jemison – Primetals Technologies, United Kingdom

11:40 [ecic_091] **Innovative two-stage blast furnace gas cleaning technology implemented at Blast Furnace no 2 in ArcelorMittal Poland Dąbrowa Górnicza plant**
M. Czaplicka – Polish Academy of Sciences, Poland
M Niesler – Upper Silesian Institute of Technology, Poland
A. Ryfa – Silesian University of Technology, Poland
M. Kocot – ArcelorMittal, Poland

12:00 [ecic_073] **Danieli Top Charging Unit: simple and flexible design, easy maintenance**
A. Glazer, E. Tesselaar, E. Engel – Danieli Corus, Netherlands

12:20 [ecic_123] **Introduction of POSCO's NO.4 Blast furnace relining and sinter facilities construction**
J.y. Jo, B.s. Yoo, T.h. Park, W.h. Byun – POSCO Steel Company, Korea

Session BIOCOAL | BIOCHAR

CHAIRPERSONS: ANNE HEIKKILÄ – LUCA OREFICI

12:40 [ecic_049] **Bio-reductants in smelting of direct reduced iron**
A. Phiri, K. Vallo, J. Hamuyuni, T. Rönnberg, T. Haimi – Metso Metals, Finland

13:00 **[ecic_125] Reduction of a basic manganese ore using biochar Kernel palm shells**
G. I. Kayombo, MK Wa Kalenga - University of Johannesburg, South Africa

13:20 **Closing remarks**
Johannes Schenk, Carlo Mapelli – Conference chairpersons

[ecic_030] **Molecular and supramolecular structure of individual fractions of low-metamorphised coal**
A. Starovoit, Y. Sorokin, Y. Malyi – USUST, Ukraine
Y. Zingerman – Independent cokemaking expert, Ukraine

[ecic_043] **Characterization of sinters after reduction in hydrogen containing atmosphere**
R. Rozmus, A. Janik, K. Radwański, M. Niesler, J. Stecko, A. Szemalikowska – Łukasiewicz - Górnośląski Instytut Technologiczny, Poland

[ecic_126] **Use of artificial neural network to predict energy consumption in the reduction zone during high carbon ferromanganese production**
MK Wa Kalenga, DK Nyembwe - University of Johannesburg, South Africa
FI Masengo - University of South Africa

NOTE OF THE PROGRAMME ***POSSIBLE CHANGES IN THE PROGRAMME WILL BE COMMUNICATED DURING THE CONFERENCE.***

updated on October 1, 2024

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GENERAL INFORMATION

CONFERENCE VENUE

The Conference will be held in Hotel Caesius Thermae & Spa Resort Via Peschiera, 3 – 37011 Bardolino VR (https://www.hotelcaesiusterme.com/en/)

LANGUAGE

The official language of the Conference will be English.

PROCEEDINGS

The full texts of all accepted papers will be published in the electronic form proceedings and issued to delegates at the Conference. A selection of the best papers will be also published in "La Metallurgia Italiana – International Journal of the Italian Association for Metallurgy" – the scientific journal of AIM, which is covered in the Science Citation index Expanded by Clarivate Analytics (formerly Thomson Reuters), and in Scopus by Elsevier B.V

CANCELLATION AND REFUND POLICY

A refund, less 20% deduction for administrative costs, will be issued for written cancellations received **by July 12, 2024**. For attendees who notify their cancellation **after July 12, 2024,** or will not attend the Conference, a charge of 100% of the Conference fee will be withheld and a copy of the proceedings will be sent after the event.

SPEAKERS CANCELLATION AND REFUND POLICY

A refund, less 20% deduction for administrative costs, will be issued for written cancellations received **before July 12, 2024**. For speakers who notify their cancellation **after July 12, 2024,** or will not attend the Conference, a charge of 100% of the Conference fee will be withheld. Their papers will be published anyway in the proceedings and a copy of the proceedings will be sent after the event.

INSURANCE

The Organising Secretariat cannot assume any responsibility for personal accident, loss or damage to the private property of participants and accompanying persons, which may either occur during or arise from the Conference. Participants should therefore take whatever steps they consider necessary as regards insurance.

REGISTRATION FEES

ALL ABOVE REGISTRATION FEES ARE REVENUE STAMP INCLUDED	AIM MEMBER	NON-MEMBER
DELEGATE (NON-PRESENTER)	**€ 910,00**	**€ 1.000,00**
SESSION CHAIRPERSON **COMMITTEE MEMBER**	**€ 750,00**	**€ 840,00**
EXHIBITORS **SPONSORS**	**€ 720,00**	**€ 810,00**
SPEAKER (PRESENTER) **BY JULY 12, 2024**	**€ 700,00**	**790,00**

STUDENT vat included **€ 500,00** after July 12, 2024
(Students will have to provide valid proof of student status)

CONFERENCE REGISTRATION FEES INCLUDE
▪ Admittance to technical sessions; ▪ Conference electronic proceedings; ▪ Social events on October 16 and 17; ▪ Coffee breaks and Lunches
For non–members (students excluded) the fee includes AIM Membership for the last quarter of 2024 and for the year 2025.

Additional ticket for Social event for accompanying persons: € 150 (plus 22% VAT**)**
(includes only the social events on October 16 and 17)

SOCIAL PROGRAMME
In order to give delegates, the opportunity to meet informally and enjoy Garda Lake's atmosphere, AIM organized two Social events:

Welcome reception at *La Loggia e la Barchessa Rambaldi* in Bardolino *(*Piazza Principe Amedeo 7) in the early evening of October 16.
Conference dinner at *Cantina Monteci* in Pescantina (via S. Michele 37) in the evening of October 17, 2024. A roundtrip transfer service will be provided.





9th ECIC European Coke and Ironmaking Congress

Bardolino . Italy . 16-18 October 2024

Exhibitors list

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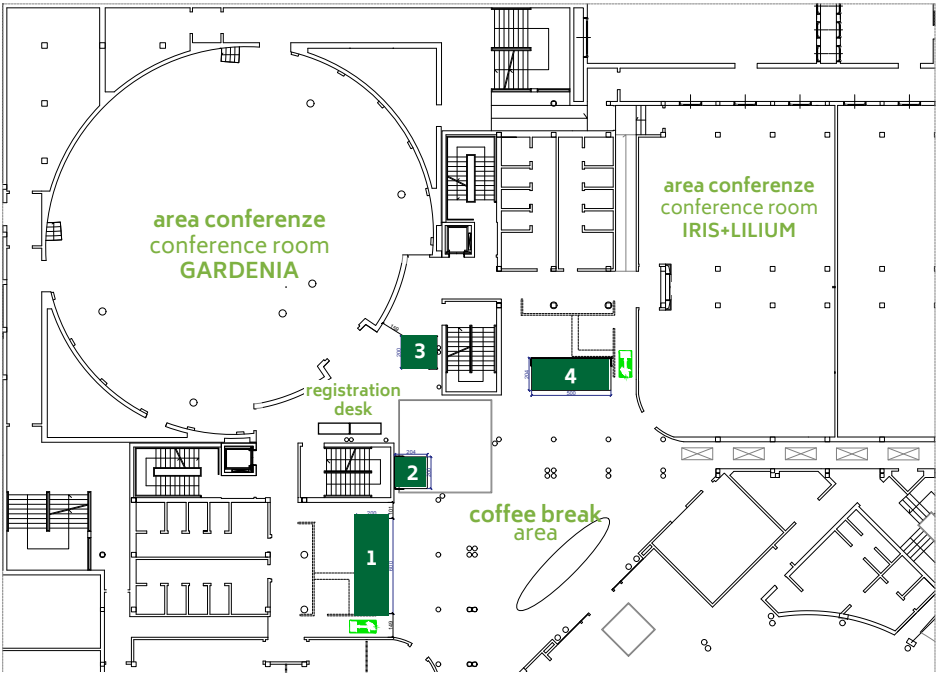

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7TH ESTAD

VERONA, ITALY
6-9 OCTOBER 2025
Palaexpo Veronafiere

ESTAD will take place for the seventh time after Paris 2014, Düsseldorf 2015, Vienna 2017, Düsseldorf 2019, Stockholm 2021 and Düsseldorf 2023.
ESTAD 2025 will be hosted by AIM, the Italian Association for Metallurgy, in Verona – Italy on 6-9 October 2025.

The knowledge and the development of the new ideas enhance progress. With the 7th European Steel Technology and Application Days 2025 (7th ESTAD 2025) AIM offers attendants and visitors the opportunity to meet, exchange their ideas, perform fruitful discussion and create new professional relationships involving technology providers, suppliers, producers and customers. The meeting will be focused on the technological advances, changes of the supply chain involving the raw materials and energy sources, transformation of the production processes and plants to accomplish the twin transition (ecological and digital) and the new perspective of steel applications.

CHAIRPERSONS

Ing. Giacomo Mareschi Danieli - Danieli
Prof. Christian Bernhard - Montanuniversität Leoben
Prof. Carlo Mapelli – Politecnico di Milano

PRELIMINARY TIMETABLE

Monday 6 October 2025 ..... Early Congress registration
Tuesday 7 October 2025 ..... Opening/plenary session | Technical sessions
Wednesday 8 October 2025 ..... Technical sessions
Thursday 9 October 2025 ..... Technical sessions | Closing session

IMPORTANT DATES

28 February 2025 ..... Abstract submission deadline
March/April 2025 ..... Scientific international experts will evaluate submitted abstracts
9 May 2025 ..... Paper proposers will be informed about decision of the Scientific International experts. Delivery of authors guidelines
30 June 2025 ..... Full paper submission deadline
15 September 2025 ..... PowerPoint/PDF presentation slides deadline

7TH ESTAD

SCIENTIFIC PROGRAM FOR 7TH ESTAD 2025

Scientific international experts in all fields of iron and steelmaking processes, steel materials and steel application will review the proposed papers.

IRONMAKING
Cokemaking
Sintering and pelletising
Blast furnace ironmaking
Direct reduction and smelting reduction

STEELMAKING
Oxygen steelmaking
Electric steelmaking
Continuous casting, near-net shape casting and ingot casting

ROLLING OF FLAT AND LONG PRODUCTS, FORGING
Rolling of long and flat products
Forging

STEEL MATERIALS AND THEIR APPLICATION, ADDITIVE MANUFACTURING, SURFACE TECHNOLOGIES

HYDROGEN-BASED STEELMAKING, CO2-MITIGATION, TRANSFORMATION / ENVIRONMENT /ENERGY
CO2 mitigation in iron and steelmaking
Environmental and energy aspects in iron and steelmaking

DIGITAL TRANSFORMATION

SUBMISSION OF PAPERS

All paper proposals must be submitted online. Please visit: **www.aimnet.it/estad2025** and go to the Call for Papers section. Your abstract can be a maximum of 300 words.

To submit an abstract, please proceed as follows:
1) Write your abstract (max. 300 words)
2) Submit your abstract online at: www.aimnet.it/estad2025/ > Call for Papers section (please completely fill out all fields)
3) Papers must be submitted in English
4) All papers must focus on best practices

LANGUAGE

The conference language is English.

DEADLINE

Please submit your abstracts by 28 February 2025. All abstracts will be refereed by the scientific international experts. In the case of too many submissions, abstracts of equal quality will be accepted on a first come, first serve basis.

VENUE & TRAVEL

Palaexpo Veronafiere
Viale del Lavoro | 37135 Verona VR | Italy
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Verona is easily reachable by plane, train and car.
Full information at: https://veronacongressi.it

COMPLIANCE RULES

AIM and all cooperating organizations are committed to adhering strictly to all applicable antitrust laws. Within the context of 7th ESTAD 2025 it is strictly prohibited to discuss competitively sensitive subjects such as price-fixing agreements or agreements on quantities.

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The detailed exhibiting and sponsorship packages will be available on the ESTAD website in the following months. In the meantime, companies interested in taking part in the Exhibition or sponsoring the event may contact:

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