10th European Conference on Continuous Casting 2020

Bari • Italy
17-19 June 2020

www.aimnet.it/eccc2020

Organised by ASSOCIAZIONE ITALIANA DI METALLURGIA

in cooperation with siderweb THE ITALIAN STEEL COMMUNITY

with the support of Federacciai
### Wednesday, 17 June 2020

**7:30** | Registration of Attendees  
---|---
**9:10** | Opening Session  
**11:10** | **Nicolaus Room (-1 Floor)**  
**11:30** | Microstructural Transformation & Surface Defect I  
**12:05** | Lunch  
**13:45** | **Nicolaus Room (-1 Floor)**  
**14:15** | **Nicolaus Room (-1 Floor)**  
**14:30** | Microstructural Transformation & Surface Defect II  
**16:20** | Coffee Break  
**16:50** | Microstructural Transformation & Surface Defect III  
**19:10** | End of First Day  

### Thursday, 18 June 2020

**8:15** | **Nicolaus Room (-1 Floor)**  
**8:45** | **Nicolaus Room (-1 Floor)**  
**9:00** | Microstructural Transformation & Surface Defect IV  
**10:50** | Coffee Break  
**11:10** | Soft Reduction and Center Segregation  
**12:50** | Lunch  
**13:45** | **Nicolaus Room (-1 Floor)**  
**14:15** | **Nicolaus Room (-1 Floor)**  
**14:30** | Billet and Bloom Casting - Operational Results  
**16:20** | Coffee Break  
**16:50** | Billet and Bloom Casting - Surface & Internal Quality  
**18:50** | End of the Second Day  
**20:00** | Transfer Service of the Conference Dinner  
**20:30** | Conference Dinner  

### Friday, 19 June 2020

**8:15** | **Nicolaus Room (-1 Floor)**  
**8:45** | **Nicolaus Room (-1 Floor)**  
**9:00** | Tundish Simulation  
**10:50** | Coffee Break  
**11:10** | Tundish - New Developments  
**13:30** | Closing Remarks  
**13:50** | End of the Conference
SCOPE

The 10th European Continuous Casting Conference - ECCC 2020 - will be organised by AIM, the Italian Association for Metallurgy, in Bari (Italy) on 17-19 June 2020 with focus on the status and future developments in the casting of steel.

The ECCC is a unique forum for the European continuous casting community to exchange views on the status and the future development of the continuous casting process. The Conference program is abreast of the latest developments in control and automation, advanced continuous casting technologies, application of electromagnetic technologies and mechanical devices to improve the core microstructure, the lubrication issues for improving the surface qualities. Steel metallurgical issues will be addressed as well as their physical and numerical simulation. The exchange of experience in operational practice, maintenance and first results from the recently commissioned plants will integrate the program. The Conference aims at promoting the dialogue among the delegates with industrial and academic background and among the participants in former Conferences and new members of the continuous casting community.

Cooperating organisations

• Austrian Society for Metallurgy and Materials
• Brazilian Metals and Materials Association
• Centro Nacional de Investigaciones Metalúrgicas
• Centre de Recherches Métallurgiques
• The Chinese Society for Metals
• Croatian Metallurgical Society
• Czech Steel Federation
• DVM, German Association for Materials Research and Testing
• Fédération Française de l’Acier
• Hungarian Mining & Metallurgical Society
• The Institute of Materials, Minerals and Mining
• International Stainless Steel Forum
• The Iron and Steel Institute of Japan
• Jernkontoret
• Korean Institute of Metals and Materials
• The Minerals, Metals & Materials Society
• Société Française de Métallurgie et de Matériaux
• Steel Institute VDEh
COMMITTEES

Conference Chairmen
Dr. Riccardo Carli - Prosimet, Italy
Prof. Christian Bernhard - Montanuniversitaet Leoben, Austria

Scientific and Steering Committee
BARELLA Silvia - Politecnico di Milano, Italy
BLANPAIN Bart - KU Leuven, Belgium
BOOM Rob - Delft University of Technology, The Netherlands
CHO Jungwook - POSTECH, Korea
CORNILLE Maïté - ArcelorMittal Global R&D, France
DE SANTIS Michele - Rina, Italy
GRYC Karel - The Institute of Technology and Business in České Budějovice, Czech Republic
KEMPER Gerhard - Hütenwerke Krupp Mannesmann GmbH, Germany
KÖLBL Nathalie - Montanuniversitaet Leoben, Austria
KROMHOUT Jan - Tata Steel, The Netherlands
LACHMUND Helmut - AG der Dillinger Hütenwerke, Germany
LOUHENKILPI Seppo - Aalto University, Finland
LÜNGEN Hans Bodo - Steel Institute VDEh, Germany
MAPELLI Carlo - Politecnico di Milano, Italy
MOSER Herbert - voestalpine Stahl GmbH, Austria
NORITAKA Saito - Kyushu University, Japan
PERI Roberto - Sanac, Italy
PETRITZ Bernd - RHI Magnesita Technology Center, Austria
SÖHN II - Yonsei University, Korea
THOMAS Brian G. - Colorado School of Mines, USA
WANG Wanlin - Central South University, China
YUJI Miki - JFE Steel Corporation, Japan
ZHANG Lifeng - University of Science and Technology, Beijing, China
ZHU Miaoyong - Northeastern University, China

Organising Committee
BASSANI Federica - AIM, Italy
BORDON Ettore - Cogne Acciai Speciali, Italy - President of AIM Safety & Environment Technical Committee
CAPEFERRI Guido - Consultant, Italy - President of AIM Plastic Deformation of Metals Technical Committee
DE DONATO Sabrina - AIM, Italy
DEL MORO Alessandra - Prosimet, Italy
MAPELLI Carlo - Politecnico di Milano, Italy - President of AIM Steelmaking Technical Committee
RAMPININI Gabriele - Forgiuma A. Vienna, Italy - President of AIM Forge Technical Committee
**WEDNESDAY, 17 JUNE 2020**

7:30 Registration of attendees

**WEDNESDAY, 17 JUNE 2020**  
**NICOLAUS ROOM (-1 FLOOR)**

**OPENING SESSION**

9:10 Welcome addresses  
Ing. Federico Mazzolari - AIM President  
Dr. Riccardo Carli - Conference Chairman  
Prof. Christian Bernhard - Conference Chairman

**Opening Lectures**

9:40 **CC_185** - Developments in continuous casting as reflected in the ECCC Conferences 1991 to 2017  
P.R. Scheller - TU Bergakademie Freiberg, Germany

10:10 **CC_162** - Formation mechanism and new control technology for slab corner transverse crack of micro-alloyed steel  
M. Zhu, Z. Cai - Northeastern University, China

10:40 **CC_122** - Advanced technologies to improve quality of slabs  
C.H. Yim - Pohang University of Science and Technology, Korea  
S.H. Iwon - POSCO Research Laboratories, Korea

11:10 coffee break and Opening of the Exhibition

**MICROSTRUCTURAL TRANSFORMATION & SURFACE DEFECTS I**

11:30 **CC_051** - Effect of Zener Pinning Force parameter on the transverse surface edge crack susceptibility of vanadium micro-alloyed grades during continuous casting of blooms  
E. Erdem Hornauer, U. Grafe, U. Plociennik, M. Reifferscheid, W. Klüs - SMS group GmbH, Düsseldorf, Germany  
M. Lüttenberg - ArcelorMittal Duisburg, Germany

11:50 **CC_034** - Prediction of surface defects in structural steels using a real-time coupled thermal-mechanical model  
J. Stetina, T. Mauder, L. Klimes, M. Brezina, T. Navrat, J. Petruska - Brno University of Technology, Czech Republic

12:10 **CC_068** - The effect of casting speed and secondary cooling on surface quality of micro-alloyed steel slabs during continuous casting  
H. Ibrahim, H. Palkowski - Clausthal University of Technology, Clausthal-Zellerfeld, Germany

12:30 **CC_062** - Reduction of narrow face grain boundary cracks in high Mn>3% and high Ti>0.1% grades in CC slabs  
V. Sanam, G. Mallikarjun, K. Lokesh, K. Ravishanker, T. Rajendra, M. Devasish - JSW Steel Limited, India

12:50 lunch

**PLENARY LECTURE**

13:45 **CC_184** - Quality - Productivity - Flexibility. 50 years continuous casting at voestalpine Linz  
H. Moser, K. Burgstaller, C. Fürst, S. Ilie, W. Posch, P. Reisinger - voestalpine Linz, Austria

14:15 Break for changing rooms
WEDNESDAY, 17 JUNE 2020  NICOLAIUS ROOM (-1 FLOOR)

MICROSTRUCTURAL TRANSFORMATION & SURFACE DEFECTS II

14:30  **KEYNOTE CC_109 - Quantification of critical parameters for prediction of surface crack formation in continuous casting**
R. Krobath, C. Bernhard - Montanuniversitaet Leoben, Austria

15:00  **CC_042 - Temperature prediction and process application of precipitates formation to reduce cracking susceptibility in HSLA steels**
B. Santillana - Tata Steel, Ijmuiden, The Netherlands
M. Kalicharan, P. Pabitra - Tata Steel Limited, Kalinganagar Industrial complex, India
R. Ravi, M. Singh - Tata Steel Limited, Jamshedpur, India

15:20  **CC_127 - Application of the solidification and microstructure tool IDS for quality prediction in continuous casting of steel – novel phenomenological quality criteria**
S. Louhenkilpi - University of Oulu, Finland and Aalto University, Finland
J. Miettinen, V.-V. Visuri, T. Fabritius - University of Oulu, Finland

15:40  **CC_039 - Control of micro surface cracks for casting of high carbon steels**
J. Zhang, W. Wang, L. Zhou - Central South University, China

16:00  **CC_018 - Study of continuous casting process improvement to reduce surface defect of cold rolled coil**
K. Kim, P. Jang, S.H. Lee, S.H. Yoo, T.-J. Ha - Hyundai-steel, Korea

16:20  coffee break

MICROSTRUCTURAL TRANSFORMATION & SURFACE DEFECTS III

16:50  **CC_077 - The current state of art of molten steel initial solidification study during the process of casting**
P. Lyu, W. Wang - Central South University, Changsha, China

17:10  **CC_142 - Effect of super-large austenite grains on hot ductility behavior of medium-carbon steels**
G.S. Jung, S.H. Kwon - POSCO, Korea
H. Kim, Y.-U. Heo, J.-S. Lee, C.H. Yim - Pohang University of Science and Technology, Korea

17:30  **CC_020 - Comparison of hot ductility troughs measured by Gleeble and IMC - for peritectic steel grade with Nb addition**
M.-H. Chen - China Steel Corp., Kaohsiung, Taiwan
R. Krobath, C. Bernhard - Montanuniversitat Leoben, Austria

17:50  **CC_084 - Reduced corner cracks by pulse width modulation – DynaJet Flex secondary cooling**
P. Pennerstorfer, A. Mittermair - Primetals Technologies Austria GmbH, Linz, Austria

18:10  **CC_007 - Formation mechanism and control of slab transverse corner cracks in typical micro-alloyed steel**
M. Wang, H. Zhang, X. Wang, W. Zhao - China Iron and Steel Research Institute Group, Beijing, China

18:30  **CC_189 - Influence of the continuous tertiary cooling and steel composition on the transformation cracking of billets for microalloyed steel grades**
N. Egido, A. Soto, G. Alvarez de Toledo - Sidenor I+D, Basauri, Spain

18:50  **CC_076 - Study and Control on surface defects of high carbon steel produced by slab continuous casting**
G. Liu - Shougang Group Co. Ltd., Beijing, China and University of Science and Technology Beijing, China
Q. Liu - University of Science and Technology Beijing, China
H.-B. Li, W.-J. Ma, C.-X. Ji - Shougang Group Co. Ltd., Beijing, China

19:10  End of the first day
MOLD FLUX - APPLICATIONS

11:30  **CC_095** - Effect of shear-thinning behavior on slag entrapment and mold friction during continuous casting
H. Yang - Swerim AB, Lulea, Sweden
P.E. Ramirez Lopez - Swerim AB, Lulea, Sweden and KTH, Royal Institute of Technology, Stockholm, Sweden
D. Mier Vasallo - SIDENOR I+D, Basauri, Spain
M. Cornille - ArcelorMittal, Maizières-lès-Metz, France
B. Stewart - Materials Processing Institute, Middlesbrough, United Kingdom
K. Schulz – Imerys, Oberhausen, Germany

11:50  **CC_021** - High alloyed grade developments on pilot caster: combination between measurement and calculation
T. Brullot, M. Cornille, J. Lehmann, G. Stechmann - ArcelorMittal Research Maizières-lès-Metz, France
H. Yin, T. Javadi - ArcelorMittal Research East Chicago, USA

12:10  **CC_158** - The SEN sequence length improvement Journey at LD1: A productivity enhancement of billet casters
K. Murari Choubey, P. Kumar Pandey, A. Kumar, N. Sinha, E Z Chacko, D. Garg - Tata Steel Ltd, Jamshedpur, India

12:30  **CC_154** - Proil™ a value innovation for open casting billet producers
A. Giacobbe - RHI Magnesita, Brescia, Italy
C. Eglaaeer, G. Krumpel - RHI Magnesita, Vienna, Austria
M. Alloni, R. Carli - Prosimet, Filago, Italy
C. Mapelli, S. Barella, D. Mombelli, A. Gruttadauria - Politecnico di Milano, Italy

12:50  lunch

13:45  **PLENARY LECTURE**

14:15  Break for changing rooms
MOLD FLUX - CHARACTERIZATION

14:30 KEYNOTE CC_111 - Controlling mold heat transfer by metallic particles dispersed in slag film: Design principle of innovative mold fluxes for high Al-containing steels
S.H. Hyun, J-W. Cho - Pohang University of Science and Technology (POSTECH), Pohang, Korea

15:00 CC_017 - Significance of an inclined plane test for mould slag assessment
I. Marschall - KI-MET GmbH, Leoben, Austria
H. Harmuth, V. Kircher - Montanuniversität Leoben, Austria

15:20 CC_073 - Simultaneous evaluation of viscosity and crystallization behavior of super-cooled mold flux
N. Saito, K. Nakashima - Kyushu University, Japan

15:40 CC_008 - Break temperature measurement and an automated evaluation method
N. Kölbl - Montanuniversität Leoben, Austria

16:00 CC_174 - Simulation of in-mould phenomena during continuous casting process of liquid steel
A. Kamaraj, N. Haldar, G. Chalavadi, S. Tripathy, P. Sahoo, S. Misra – CSIR-NML, Jamshedpur, India

16:20 coffee break

FLUID FLUX CONTROL – STOPPER, SEN, CLOGGING

16:50 CC_060 - Mechanism of nozzle clogging during continuous casting of Ti added ULC steel – initial formation and growth
J-H. Lee - Pohang University of Science and Technology, Korea and POSCO, Korea
M-H. Kang, J. Kim, S-K. Kim - POSCO, Korea
M-S. Kim - Korean Institute of Industrial Technology, Korea
Y-B. Kang - Pohang University of Science and Technology, Korea

17:10 CC_170 - Improvement of process yield by reduction of ladle nozzle clogging during continuous casting process at TATA Steel
K. Singh, M.S. Kadiy, P. Patnaik, R. Sangwai - TATA Steel, Odisha, India

17:30 CC_033 - Microstructural examination of post-mortem stopper noses for continuous casting of Al-killed steel
L. Loison, C. Ganser, Q. Carre - ArcelorMittal Research, Maizières-lès-Metz, France

17:50 CC_078 - Development of SEN slag line material for life time improvement
J. Han, J. Lee, Y. Park, W. Ki, J. Hwang, S. Ryu, W. Cho - Hyundai-steel, Chungnam, Korea

18:10 CC_100 - Investigation of pressure distribution on different stopper designs in a continuous casting simulator based on liquid metal
J. Eck - Swerim AB, Luleå, Sweden
P.E. Ramirez Lopez - Swerim AB, Luleå, Sweden and KTH Kungliga Tekniska Högskolan, Sweden
G. Hachl, G. Nitzl - RHI Magnesita, Austria

18:30 CC_171 - Improvement of process yield of Si killed electrical steel at continuous casting using conventional MgO-C refractories
P. Pattanayak, P. Palai, A.S. Saini, V. Mahashabde - TATA Steel, Odisha, India

18:50 CC_180 - Effect of aluminum to calcium ratio of liquid steel on clogging and erosion of special refractories in continues casting
E. Mogaddas, G. Salimi, M.A. Shafei Dehnavi - Mobarake Steel Co., Esfahan, Iran

19:10 End of the first day
WEDNESDAY, 17 JUNE 2020  
CASSIOPEA ROOM (+1 FLOOR)

INDUSTRY 4.0

11:30  CC_145 - Towards digitalization of steel melt shop: A model-based approach  
A. Nandwana, G. Madenoor Ramapriya - ABB Ability Innovation Center, Bangalore, India  
T. Mathur, Praveen KC - ABB India Limited, Bangalore, India

11:50  CC_028 - i-gVard: Smart ladle slide gate’s refractory plates evaluation tool  
C. Picard, E. Martin, D. Rolland - Vesuvius Flow Control Digital Services, France

12:10  CC_083 - Software-as-a-Service in the metals industry – challenges, requirements and opportunities  
R. Leitner, D. Fuchshuber, B. Jozic - Primetals Technologies Linz Austria

12:30  CC_115 - How to obtain a reliable feedback on your continuous casting production  
G. Maccani - BM Group Polytec, Borgo Chiese, Italy

12:50  lunch

13:45  PLENARY LECTURE  
NICOLAUS ROOM

14:15  Break for changing rooms
INDUSTRY 4.0 II

14:30  **KEYNOTE CC_175** - Smart production with new measure devices for continuous casting  
Primeitals Technologies Austria GmbH, Linz, Austria

15:00 **CC_002** - Digital dynamic managed services – Achieving the next level of performance in caster maintenance  
D. Jeffrey, C. Häusler, R. Buttgerie - SMS group GmbH, Germany

15:20 **CC_053** - Virtual experimentation in continuous casting towards online control  
J. Fainberg, E. Hepp, S. Koldorf - MAGMA GmbH, Aachen, Germany

15:40 **CC_093** - Continuous Casting Process optimization: A Level 2 automation platform  
G. Maccani - BM Group Polytec, Borgo Chiese, Italy

16:00 **CC_125** - Automated 3D surface inspection system - unveiling the invisible  
T. Köpsel - IMS Messsysteme GmbH, Germany

16:20  coffee break

CONTROL SYSTEMS I

16:50 **CC_090** - Detecting and controlling mold fluid flow with ABB Ability™ Optimold Control for FC Mold  
M. Sedén, P. Rybing, N. Jacobson - ABB AB, Sweden  
J.H. Hwang - Hyundai Steel, Korea

17:10 **CC_177** - Mould level control: Q-Level+ with double sensor in Danieli DUE Endless TSC  
G. Donati, L. Orsettig, D. Nong - Danieli Automation. Italy  
M. Fornasier - Danieli, Italy  
T. Pindur - Vuhz

17:30 **CC_150** - Simple, innovative FBG optical fiber installation in copper plates for continuous caster  
E. Castiaux, G. Zuliani - EBDS Engineering Sprl, Belgium  
J. Meseha - CSN Carl Schreiber GmbH, Germany

17:50 **CC_108** - The mold temperature mapping with Ultrasonic Contactless Technology is the key for the real time initial solidification process control tools  
I. Mazza, S. Miani, G. Schiavon, S. Spagnul - Ergolines LAB, Padriciano, Italy

18:10 **CC_128** - X-Pact® Process Guidance: process optimization, condition monitoring, quality evaluation, metallurgical parameter administration and operator guidance - fully integrated in one system  
R. Wilmes, L. Schaps, G. Nowak - SMS group GmbH, Germany

18:30 **CC_129** - X-Pact® Width Control – Technology and experience report  
L. Schaps, R. Wilmes, H. Beyer-Steinhauer - SMS group GmbH, Germany

19:10  End of the first day
THURSDAY, 18 JUNE 2020  NICOLAUS ROOM (-1 FLOOR)

8:15  PLENARY LECTURE

CC_186 - State of the art in computational modeling of defect formation in continuous casting of steel
B.G. Thomas - Colorado School of Mines, USA

8:45  Break for changing rooms

MICROSTRUCTURAL TRANSFORMATION & SURFACE DEFECTS IV

9:00  KEYNOTE CC_144 - Approaches for process optimization in continuous casting of slabs at Hüttenwerke Krupp Mannesmann
T. Bolender, G. Kemper, B. Rabe, Markus Schürmann - Hüttenwerke Krupp Mannesmann GmbH, Duisburg, Germany
D. Senk, C. van den Berg - RWTH Aachen University, Germany

9:30  CC_011 - The influence of strain rate on the hot ductility of a continuously cast Ti-Nb microalloyed steel
M. Gontijo - K1-MET GmbH, Austria
C. Hoflehner, C. Sommitsch - Graz University of Technology, Austria
S. Ilie, J. Six - voestalpine Stahl Linz GmbH, Austria

9:50  CC_096 - Microalloying elements and solidification conditions as influencing factors on the second ductility minimum
C. Fix, D. Senk - RWTH Aachen University, Germany

10:10 CC_088 - Castability of advanced high strength steels
B. Webler, R. Coura Giacomin - Carnegie Mellon University, Pittsburgh, USA

10:30 CC_056 - The mechanical and metallurgical engineering connection during the continuous casting of microalloyed steels
S.G. Jansto - Resources and Development Resources, USA

10:50  coffee break

SOFT REDUCTION AND CENTER SEGREGATION

11:10 CC_082 - Hitting the spot every time: Single Roll Dynagap (SRD) Segment for an efficient reduction of center segregation and porosities
P. Pennerstorfer, A. Jungbauer - Primetals Technologies Austria GmbH, Linz, Austria

11:30 CC_098 - Implementation of thermal taper and static soft reduction on the Whyalla combination Caster at Liberty Steel Australia for slab quality improvements
J. Peltonen, J. Varcin, K. Murphy - Liberty Steel Australia, Whyalla, South Australia
A.W.A. Smith, A. Bell, P. Kitson, A. Williams - Materials Processing Institute, Middlesbrough, United Kingdom

11:50 CC_133 - Research on central segregation control of high strength hull steel slab
F. Yu, M. Xu, X. Liao, L. Huang, D. Li - Ansteel Group Iron & Steel Research Institute, Anshan, China
Y. Ma, L. Gao - AngangSteel Co. Ltd., Anshan, China

12:10 CC_137 - Dynamic mechanical soft reduction for quality improvement
P. Armenante, R.P. Pardela - Danieli, Italy

12:30 CC_026 - Analysis and application of soft reduction model in round billet continuous casting
L. Li, B. Li, P. Lan, J. Zhang - University of Science and Technology Beijing, China
Z. Zhang, M. Luo - Baoshan Iron & Steel Co. Ltd., Shanghai, China

12:50  lunch
THURSDAY, 18 JUNE 2020

NICOLAUS ROOM (-1 FLOOR)

13:45  PLENARY LECTURE

D. Senk - RWTH Aachen University, Germany

14:15  Break for changing rooms

BILLET AND BLOOM CASTING – OPERATIONAL RESULTS

14:30  KEYNOTE CC_057 - Powder dosing with mould temperature feedback control in continuous casting of stainless steel for high quality billet surfaces
C. Scarabelli, D. Olivero, F. Bego - Cogne Acciai Speciali, Italy
I. Mazza, S. Spagnul, G. Schiavon - Ergolines Lab, Italy

15:00  CC_157 - Development of continuous casting machine in Feralpi Siderurgica since solidification modelling approach till revamping for 150 mm billets size casting
M. Fusato, L. Angelini, G. Foglio, Leali, P. Frittella, C. Di Cecca, Boschetti, Milan - Feralpi Siderurgica, Italy

15:20  CC_119 - Effect of promotive force of in-mold ems on the solidification structure on billet casting
H. Harada - Nippon Steel Corporation Research & Development, Japan

15:40  CC_041 - Radiofrequency sensor for measuring the thickness of mold powder for continuous casting of billets and blooms
F. Macci, F. Menchetti - Rina Consulting- Centro Sviluppo Materiali, Italy

16:00  CC_030 - Research and application of soft reduction technology in bloom continuous casting

16:20  coffee break

BILLET AND BLOOM CASTING – SURFACE & INTERNAL QUALITY

16:50  CC_079 - Single Roll DynGap (SRD) Segments for optimum internal quality of billets
D. Burzic, P. Pennerstorfer, M. Riedler, A. Jungbauer - Primetals Technologies Austria GmbH, Linz, Austria

17:10  CC_102 - Design features of bloom casters for a high end product mix and achieved quality results
S. Baf, M. Knabl, O. Novokshonov, H. Holzgruber - INTECO melting & casting technologies GmbH, Austria

17:30  CC_168 - Cooling technology of continuous casting for increasing the surface quality of beam blank
T. Park, H. Jung, y. Pyo, Y. Kim, J. Kim - Dongtuk steel, Pohang, Korea

17:50  CC_103 - Stabilization control of continuous casting billet solidification structure of high carbon steel grades to alleviate center segregation through numerical simulation method
K. Liu, Q. Sun - Research Institute of Technology Shougang Group, Beijing, China

18:10  CC_182 - Optimization of casting conditions of 406mm round billets to improve pipe quality
M. Modesto, D. Rezende, R. Santos, M. Sacramento, L. Dutra, C. Nery Abreu - Vallourec Soluções Tubulares, Brazil

18:30  CC_050 - Technologies in bloom and billet continuous casters supplied by SMS Concast in recent projects in China
P. Nolli, D. Kabosch, M. Meier, M. Abram - SMS Concast AG, Zurich, Switzerland

18:50  End of the second day
## INCLUSIONS MODELLING

### KEYNOTE CC_086 - Understanding slag-steel-inclusion multiphase reactions in ladle and tundish for improvement of steel cleanliness during continuous casting process: Experimental approach and computational simulations

T. Kim - Hanyang University, Korea  
J. Shin - Hyundai Steel Company, Korea  
L. Holappa - Aalto University, Finland  
P. Jönsson - KTH Royal Institute of Technology, Sweden  
J. Park - Hanyang University, Korea and KTH Royal Institute of Technology, Sweden

### CC_069 - Alumina inclusion defect distribution in continuous cast steel slabs

S-M. Cho, B.G. Thomas - Colorado School of Mines, Golden, USA  
J-Y. Hwang, J-G. Bang, I-S. Bae – POSCO, Korea

### CC_003 - Prediction of inclusion formation behavior during refining and solidification of steel

J.H. Shin, J.S. Han, C.H. Chang - Hyundai Steel, Korea  
J.H. Park - Hanyang University, Korea

### CC_123 - A model for inclusion precipitation kinetics during solidification of steel

Q. Shu, T. Alatarvas, T. Fabritius - University of Oulu, Finland

### CC_063 - Spatial distribution of composition and number density of inclusions on the cross section of steel continuous casting slab

W. Chen, Y. Zhang, J. Wang, Y. Ren, W. Yang - University of Science and Technology Beijing, China  
L. Zhang - Yanshan University, China

### MOLD FLUX - MATERIALS

### CC_113 - Effect of CaO substitution with BaO for development of F-free mold fluxes

Z. Wang, I. Sohn - Yonsei University, Seoul, Korea

### CC_010 - Higher than one. Triggering crystallization in mold flux slag

R. Carli, M. Alloni, G. Martino, O. Wunderlich - Prosimet, Filago, Italy

### CC_161 - Effects of SiO2 contents and alkali oxide on the crystallization behavior of CaO-Al2O3 based continuous casting mold fluxes for high Al and high Ti-containing steels

G. Kim, I. Sohn - Yonsei University, Seoul, South Korea

### CC_067 - Substitution of wollastonite in casting fluxes - Impact on production process and on application in mould

H. Tavernier - Imerys France  
M. Pereira - Imerys Brazil  
K. Schulz - Imerys Germany  
S. Jauch - Imerys USA

### CC_013 - Structure and its effect on viscosity of fluorine-free mold flux: Substituting CaF2 with B2O3 and Na2O

T-m. Yeo, J-W. Cho - Pohang University of Science and Technology, Korea  
M. Alloni, S. Casagrande, R. Carli - Prosimet, Italy
COOLING TECHNOLOGIES I

14:30  **KEYNOTE CC_121** - Investigations on primary cooling in CC mould through the use of modeling approach  
  JF. Domgin, S. Gauthier - ArcelorMittal Maizières Global R&D, Maizières-Les-Metz, France

15:00  **CC_169** - Notable development of secondary cooling in continuous casting  
  J-Y. Hwang - POSCO, Korea  
  M. Raudensky, M. Pohanka, J. Kominek, T. Luks - Brno University of Technology, Czech Republic

15:20  **CC_094** - Improvement of secondary cooling strategies to optimize strand quality and operative aspects trough thermo-mechanical modeling  
  G. Poltarak, C. Cicutti - Tenaris Center of Industrial Research, Buenos Aires, Argentina

15:40  **CC_099** - Intensification of the secondary cooling by the presence of the oxide layer on the steel slab surface  
  M. Chabicovsky, O. Resl, P. Kotrbacek, M. Raudensky - Brno University of Technology, Czech Republic

16:00  **CC_012** - Energy Efficiency in Secondary Cooling – new generation of hydraulic nozzles with increased water turn down ratio and cooling efficiency for slab casting processes  
  J. Frick, R. Wolff - Lechler GmbH, Germany  
  A. Carboni, R. Conte - Danieli & C. Officine Meccaniche, Italy

16:20  coffee break

COOLING TECHNOLOGIES II

16:50  **CC_055** - Investigation of spray cooling uniformity and intensity during continuous casting of steel  
  H. Ma, A. Silaen, C. Zhou - Purdue University Northwest, Hammond, USA  
  R. Liu - ArcelorMittal Global Research and Development, East Chicago, USA

17:10  **CC_040** - Secondary cooling: laboratory heat transfer measurements  
  M. Javurek - Johannes Kepler University Linz, Austria  
  H. Kogler - LCM  
  A. Mittermair – Primetals

17:30  **CC_044** - Cooling process control for preventing fracture in cold charging of continuously cast high strength steel slabs  
  M. Komori, T. Miyake, H. Ohta, S. Kimura, T. Murakami - Kobe Steel Ltd, Japan

17:50  **CC_019** - Effects of cooling methods and cooling conditions on behavior of thermal distortion and stress generation of steel blooms cast continuously on reverse transformation treatment  
  K. Isobe, I. Watanabe, K. Fujita - National Institute of Technology Akita College, Japan

18:10  **CC_120** - Heat transfer coefficient during spray cooling of very hot surfaces by flat nozzles  
  H. Bellerova, T. Luks, M. Raudensky, O. Resl - Brno University of Technology, Czech Republic

18:30  **CC_038** - Simulation study of sub-rapid solidification and secondary cooling process for the strip casting of IF steel  
  H. Zhang, W. Wang, P. Lyu - Central South University, China

18:50  End of the second day
**THURSDAY, 18 JUNE 2020**

**CASSIOPEA ROOM (+1 FLOOR)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15</td>
<td><strong>PLENARY LECTURE</strong></td>
<td><strong>NICOLAUS ROOM</strong></td>
<td></td>
</tr>
<tr>
<td>8:45</td>
<td>Break for changing rooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>CONTROL SYSTEMS II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td><strong>KEYNOTE</strong> CC_167 - Advanced liquid steel flow control system at US Steel derived by aerospace technology</td>
<td>M. Fornasier, G. Paulon - Danieli, Italy</td>
<td></td>
</tr>
<tr>
<td>9:30</td>
<td><strong>CC_140</strong> - Advanced cast product quality testing</td>
<td>T. Gusarova, S. Six, S. Schulze - SMS group GmbH, Germany; R. J. van den Bogert, A. A. Kamperman - Tata Steel IJmuiden, The Netherlands</td>
<td></td>
</tr>
<tr>
<td>9:50</td>
<td><strong>CC_049</strong> - CONDRIVE – The direct mould oscillation drive technology by SMS Concast</td>
<td>P. Nolli, D. Kabosch, M. Meier, M. Abram - SMS Concast AG, Zurich, Switzerland</td>
<td></td>
</tr>
<tr>
<td>10:10</td>
<td><strong>CC_105</strong> - Dynamic SuperHeat determination in a Continuous casting machine – supporting green steel - practice and benefits</td>
<td>P. Hughes-Narborough, S. Pagden - Heraeus Electro-Nite (UK) Ltd, Chesterfield, United Kingdom</td>
<td></td>
</tr>
<tr>
<td>10:30</td>
<td><strong>CC_080</strong> - Digital Twin for continuous casters – the playground for metallurgists and process engineers</td>
<td>R. Leitner, D. Fuchshuber, C. Brugger, P. Pennerstorfer - Primetals Technologies, Linz, Austria</td>
<td></td>
</tr>
<tr>
<td>10:50</td>
<td>coffee break</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NUMERICAL SIMULATION I</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:10</td>
<td><strong>CC_004</strong> - Robust copper plate hot face temperature soft sensor algorithm</td>
<td>A. Krasilnikov, W. Klos, M. Arzberger - SMS group GmbH, Germany</td>
<td></td>
</tr>
<tr>
<td>11:30</td>
<td><strong>CC_037</strong> - Mathematical simulation of straightening in the continuous slab casting</td>
<td>R. Fernandes Reis, T. Magno Fuzessy de Melo, L.J. Silva De Oliveira - USIMINAS, Ipatinga, Brazil; R. Parreiras Tavares – Federal University of Minas Gerais, Brazil</td>
<td></td>
</tr>
<tr>
<td>11:50</td>
<td><strong>CC_135</strong> - Industrial application of numerical modelling, characterization and plant monitoring for prevention of defects during continuous casting</td>
<td>R.M. Pineda Huitron, E. Vuorinen - Luleå University of Technology, Sweden; P.E. Ramirez Lopez - Swerim AB, Luleå, Sweden and Royal Institute of Technology (KTH), Stockholm, Sweden; M.E. Kärkkäinen - SSAB Europe, Raahi, Finland</td>
<td></td>
</tr>
<tr>
<td>12:10</td>
<td><strong>CC_066</strong> - Numerical and experimental studies on fluid flow in continuous casting with a stopper rod control system</td>
<td>R. Liu, H. Yin, B. Forman, R. Moravec, Y. Lee - ArcelorMittal Global R&amp;D at East Chicago, USA; R. Zhou - Purdue University Northwest, USA</td>
<td></td>
</tr>
<tr>
<td>12:30</td>
<td><strong>CC_043</strong> - Minimising steel intermix in CC slabs via an online tool CFD-modelling based</td>
<td>M. De Santis, N. De Santis, D. Fera, R. Tonelli - Rina Consulting- Centro Sviluppo Materiali, Italy; S. Oktay, A. Oran - Colakoglu Metalurji, Dilovasi, Kocaeli, Turkey</td>
<td></td>
</tr>
<tr>
<td>12:50</td>
<td>lunch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NUMERICAL SIMULATION II

14:30  KEYNOTE  CC_134 - A comprehensive slice model for continuous casting of steel  
B. Šarler, B. Mavrič - University of Ljubljana, Slovenia and Institute of Metals and Technology, Ljubljana, Slovenia  
T. Dobravec - Institute of Metals and Technology, Ljubljana, Slovenia  
R. Vertnik - University of Ljubljana, Slovenia and Štore-Steel, Slovenia

15:00  CC_024 - Proposal for introduction of dendrite breaking of steel by molten steel flow to cellular automaton method  
S. Morita - JFE Steel Corporation, Japan

15:20  CC_152 - Simulation of segregation in the continuous casting of an alloy steel  
B. Ērzar, E. Baganus-Colle - ABS Centre Métallurgique, Metz, France  
S. Marzio, M. Truant - Acciaierie Bertoli Safau (ABS), Pozzuolo del Friuli, Italy

15:40  CC_052 - Bubbly mould flow in continuous casting: challenges for numerical flow simulations  
M. Javurek - Johannes Kepler University Linz, Austria  
R. Wincor - voestalpine

16:00  CC_048 - Simulation and validation of the precipitation mechanism responsible for the right flank of the ductility minimum  
P. Estermann, E. Kozeschnik - Vienna Technical University, Austria  
J. Six, S. Ilie - voestalpine Stahl, Linz, Austria

16:20  coffee break

NUMERICAL SIMULATION III

16:50  CC_151 - Mold powder entrapment by vortex core phenomena in continuous casting mold  
J.H. Lee, I.S. Park - Kyungpook National University, Korea  
S.W. Han, H.J. Cho - POSCO, Korea

17:10  CC_071 - A machine learning model in combination of in-situ thermal analysis to determine phase transformations during continuous cooling in advanced steels  
O. Rova, J. Chen, W. Mu - KTH Royal Institute of Technology, Stockholm, Sweden

17:30  CC_045 - Development of hot ductility prediction model for steels using deep neural network: a comparison of symmetric and asymmetric approach  
D-G. Hong, C-H. Yim - Pohang University of Science and Technology, South Korea  
S-H. Kwon - POSCO Research Laboratories, South Korea

17:50  CC_092 - Investigating the flow structure in model moulds of slab casting using contactless inductive flow tomography  
M. Ratajczak, T. Wondrak, I. Glavinic, K. Timmel, F. Stefani, S. Eckert - Helmholtz-Zentrum Dresden - Rossendorf, Germany

18:10  CC_118 - Correlation between lab-scale wedge mould castings and slab samples, a method for new alloy development  
B. Santillana, K. Hechu - Tata Steel, Ijmuiden, The Netherlands  
A. SenGupta, M. Auinger - University of Warwick, United Kingdom

18:30  CC_159 - Thermomechanical FEM modeling of thin slab continuous casting  
O.S. Khlybov, V.V. Zorikhin, V.V. Kislitsa - Vyksa Steel Works, Russia

18:50  End of the second day
THURSDAY, 18 JUNE 2020

CIGNO ROOM (+2 FLOOR)

8:15 PLENARY LECTURE

8:45 Break for changing rooms

BILLET AND BLOOM CASTING – FLUID FLOW IN THE MOLD

9:10 CC_179 - Effect of EMS current intensity and frequency on billet macrostructure
A. Kareem, R. Khan - HADEED-SABIC, Jubail, Saudi Arabia

9:30 CC_059 - Simulation and optimization study of the swirling nozzle for eccentric flow fields of round molds
P. Lin, Y. Jin, X. Dong, J. Zhu, F. Ai, C. Cheng, Y. Li - Wuhan University of science and technology, China

MOLD LEVEL BEHAVIOUR AND CONTROL

9:50 CC_149 - Sub meniscus velocimetry – An efficient way to study flow in the mould
G. Hackl, W. Fellner, G. Nitzl, G. Krumpel, C. Eglsäer - RHI Magnesita, Leoben, Austria

10:10 CC_132 - Analyzing of free surface and discharging jet behavior in continuous casting process through physical water model
P. Nazem Jalali, J. Ech - Swerim AB, Luleå, Sweden

10:50 coffee break

SUPPORT CAST Project

11:10 CC_187 - RFCS SUPPORT-CAST: State-of-Art on inspection and numerical modelling of surface defects during continuous casting of steel
P.E. Ramirez Lopez - Swerim AB, Luleå, Sweden and KTH Royal Institute of Technology, Stockholm, Sweden
S. Kesavan - Swerim AB, Luleå, Sweden
M. Petajäjärvi, C. Schmidt - Outokumpu Stainless AB, Avesta, Sweden
X. Pereda, D. Mier Valsallo - SIDENOR I+D, Basauri, Spain
B. Feldmeyer - VDEh-Betriebsforschungsinstitut GmbH, Düsseldorf, Germany
P. Frittella - Feralpi Siderurgica, Lonato del Garda, Italy

11:30 CC_160 - Surface quality monitoring – Important piece of the puzzle to control and improve the quality of cast products
H. Suopajärvi, S. Kautonen - Sapotech Oy, Oulu, Finland
D. Mier Valsallo - Sidenor Investigación y Desarrollo S.A., Spain
J. Larsson - Outokumpu Stainless AB, Avesta, Sweden

11:50 CC_124 - High temperature scanning technique for online mapping of defects during casting of duplex stainless-steel
S. Kesavan - Swerim AB, Sweden
T. Avila, A. Slagter - Luleå University of Technology (LTU), Sweden
P.E. Ramirez Lopez - Swerim AB, Sweden and Royal Institute of Technology (KTH), Sweden
C. Schmidt - Outokumpu Stainless AB, Sweden

12:10 CC_164 - Sapotech Reveal Platform – Machine vision based solution platform for digitalization of metallurgical processes
S. Kautonen, H. Suopajärvi, P. Parhi - Sapotech Oy, Oulu, Finland

12:30 Question & Answers

12:50 lunch
VALCRA Project

14:30 Welcome and introduction
   CC_191 - ECSC funding for dissemination projects
   Launch of questionnaire
   A. Gotti, M. De Santis - Rina Consulting- Centro Sviluppo Materiali, Italy

14:45 CC_192 - Statistics from project analysis
   A. Gotti - Rina Consulting- Centro Sviluppo Materiali, Italy

15:00 CC_193 - Fundamentals on cracking – precipitation
   G. Alvarez de Toledo - Sidenor I+D, Basauri, Spain

15:15 CC_194 - Cracks occurrence: Modelling features
   P. Ramirez Lopez - Swerim AB, Luleå, Sweden

15:30 CC_195 - Crack formation: Process conditions
   A. Gotti - Rina Consulting- Centro Sviluppo Materiali, Italy

15:45 CC_196 - On mould powders role in crack formation
   S. Higson - Materials Processing Institute, United Kingdom

16:00 CC_197 - Cracking prevention/monitoring: Process control & sensoring
   K. Marx - BFI, United Kingdom

16:20 coffee break

16:45 Experiences 1-2 from stakeholders

17:05 Road map features
   A. Gotti - Rina Consulting- Centro Sviluppo Materiali, Italy

17:30 Round table/ open discussion

18:15 Final remarks
   M. De Santis - Rina Consulting- Centro Sviluppo Materiali, Italy

18:30 End of the workshop
FRIDAY, 19 JUNE 2020  NICOLAUS ROOM (-1 FLOOR)

8:15  **PLENARY LECTURE**
Andrea Bianchi – Arvedi, Italy

8:45  **Break for changing rooms**

**TUNDISH - SIMULATION**

9:00  **KEYNOTE CC_046** - A study of chemical interaction between tundish lining refractory/steel and tundish powder/steel for continuous casting
F. Shahbazian, J. Lönqvist, C. Eggertson, M. Ek - Swerim AB, Kista, Sweden

9:30  **CC_153** - Influence of steel temperature variations in the Tundish on mold level stability and on transition slabs quality
V. Delvaux, M. Sinnaeve, C. Hardy - ArcelorMittal Industeel
J. Richaud, E. Hilgenhöner, J. Delacroix, L. Schaubroeck - Vesuvius

9:50  **CC_074** - Multiphase flow in a tundish using electromagnetic swirling ladle shroud during steady-state casting and ladle changeover
Q. Fang, H. Zhang, J. Wang, H. Ni - Wuhan University of Science and Technology, China

10:10 **CC_091** - Numerical simulation of liquid steel flow through the slab tundishes with a modern subflux turbulence controller
A. Cwudziński - Czestochowa University of Technology, Poland

10:30 **CC_035** - Effect of swirling upper nozzle on flow separation behavior of molten steel near inner wall of tundish upper nozzle
C. Zhang, C. Cheng, Y. Li, X. Qin, W. Wu, Y. Jin, H. Sun - Wuhan University of Science and Technology, China

10:50 **coffee break**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30</td>
<td>CC_155 - The effect of tundish flow controller to stainless steel cleanliness at Outokumpu Tornio CCM2</td>
<td>S. Juvantkoski - Laukamo Group, Somero, Finland, M. Petäjäjärvi - Outokumpu Stainless Oy, Tornio, Finland</td>
</tr>
<tr>
<td>11:50</td>
<td>CC_031 - Research on flow control device and metallurgical effect of Tundish for bloom CCM</td>
<td>Z. Sun, W. Qiu, L. Zeng, J. Guo - Baowu Group Guangdong Shaoguan Iron and Steel Co. Ltd., China</td>
</tr>
<tr>
<td>12:30</td>
<td>CC_112 - Tundish refractory design optimization through mathematical and physical modeling</td>
<td>A. Dolabella Resende - RHI Magnesita, Brazil, G. Lukesch, G. Hackl, D. Meurer - RHI Magnesita, Austria</td>
</tr>
<tr>
<td>12:50</td>
<td>CC_188 - Reduction in slab cast downgrades in ULC grade by reducing variations in stopper position and by improving mould level fluctuations using customized refractory</td>
<td>K. Ravi Shekar, A. Kumar, A. Sakar, V. Surayanana - JSW Vijayanagar, India, R. Mukhekar, M. Sabhapathy, J. Richaud - Vesuvius, France</td>
</tr>
<tr>
<td>13:30</td>
<td>Closing Remarks</td>
<td></td>
</tr>
<tr>
<td>13:40</td>
<td>End of the Conference</td>
<td></td>
</tr>
</tbody>
</table>
8:15  **PLENARY LECTURE**  
**NICOLAUS ROOM**

8:45  **Break for changing rooms**

---

**FRIDAY, 19 JUNE 2020  
NICOLAUS B ROOM  [-1 FLOOR]**

**PLANT ENGINEERING I**

9:00  **KEYNOTE**  
**CC_J56** - Technology and controls improvements on the continuous casting of Acciaierie di Calvisano for improvements on solidification process and new steel grades  
Angelini, Bersani, P. Frittella, Guerra, DiMora, Miglietta, Milan - Acciaierie di Calvisano, Italy

9:30  **CC_081** - How to reach maximum steel quality through mold level control in continuous casting  
V. Humer, P. Wimmer - Primetals Technologies Linz Austria

9:50  **CC_J30** - The intelligent Jumbo Caster for high-quality slabs at Rizhao Shandong  
I. Olgemöller, J. Wans, L. Fischer - SMS group, Düsseldorf, Germany  
Q. Zheng - Shandong Steel Group Rizhao Co. Ltd., China  
J. Yuan - SMS Siemag Technology (Beijing) Co. Ltd., China

10:10  **CC_J38** - Development and production of the largest beam-blank in the world in submerged casting  
M. Fornasier, P. Pardela, P. Armenante - Danieli, Italy  
J. Richaud, E. Hilgenhoener - Vesuvius, Germany

10:30  **CC_005** - Implementation of state of the art technologies, a “Second life” for existing continuous casting plants  
U. Zanelli - Sarralle Equipos Siderurgicos S.L., Italy

10:50  **coffee break**
PLANT ENGINEERING II

11:10  **CC_054 - Challenges and solution of high throughput casting technology**  
J. Mueller, C. Cecere, C. Klein, C. Fröhling - SMS group, Düsseldorf, Germany

11:30  **CC_104 - Investigation on corrosion of continuous casting mold coatings**  
A. Vopneruk - Joint Venture Mishima-Mashprom LLC, Yekaterinburg, Russia and Ural Federal University, Yekaterinburg, Russia  
A. Kotelnikov - Joint Venture Mishima-Mashprom LLC, Yekaterinburg, Russia  
A. Dagman - Novolipetsk Steel PJSC, Lipetsk, Russia  
M. Karabanalov - Ural Federal University, Yekaterinburg, Russia  
K. Yamamoto - Mishima Kosan Co. Ltd, Kitakyushu, Japan

11:50  **CC_173 - Arcelor Mittal Tubarão: superior quality and higher productivity after modernization of CCM#2 slab caster**  
M. Fornasier, A. Benedetti, A. Besiedin – Danieli, Italy  
A. Nascimento, D. Ruy, A. Almeida, C. Silva - AM Tubarão

12:10  **CC_016 - Start up of an extra large section slab caster of PosMC (POSCO Mega Caster)**  

12:30  **CC_101 - Segment casting: a new technology enters the market – an overview on plant design and first results**  
M. Knabl, O. Novokshonov, S. Baf, H. Holzgruber - INTECO melting & casting technologies GmbH, Austria

12:50  **CC_181 - The successful casting machine ramp up at Vallourec - Production and quality results**  
M. Modesto, S. Houel, D. Rezende, O. Ferreira, S. Bastos, T. Oliveira, L. Birkhauser - Vallourec Soluções Tubulares, Brazil

13:10  **CC_006 - Breakouts during casting (the big casting monster)**  
M. Talaat, M. Abu Mossaed - Ezz Dekhila Steel Company, Alexandria, Egypt

13:30  **Closing remarks in Nicolaus Room**

13:40  **End of the Conference**
8:15  PLENARY LECTURE  NICOLAUS ROOM
8:45  Break for changing rooms

FRIDAY, 19 JUNE 2020  CASSIOPEA ROOM (+1 FLOOR)

THIN SLAB CASTER

9:00  KEYNOTE CC_097 - Reduction of transverse corner cracks in the Tata Steel Ijmuiden Direct Sheet Plant
R. Kalter, J. van ‘t Hul, S. Meijer, J. Kromhout, B. Santillana, A. Burghardt, J. Linh, C. Toeniges, E. Gillebaart, L. Koomen - Tata Steel Europe, Ijmuiden, The Netherlands

9:30  CC_165 - Productivity and performances enhancing in OMK for X70 arctic via thin slab rolling fed by EAF
R. Sellan, M. Fornasier, B. Vucinic, O. Rott - Danieli, Italy
V. Kislica, A. Muntin - JSC “Vyksa Steel Works”, Russia

9:50  CC_089 - High throughput thin slab caster mold flow optimization with flexible core EMBR
M. Sedén, N. Jacobson - ABB AB, Sweden
A.-Y. Zhong - ABB Ltd., China

10:10  CC_085 - Latest advancements in ESP casting technology
J. Watzinger, I. Watzinger, S. Gutlic - Primetals Technologies Austria GmbH, Linz, Austria

10:30  CC_166 - Improved product quality at Tangshan Iron & Steel Group thin slab caster by operating Danieli Rotelec Multi Mode Electromagnetic Brake System (MM-EMB®)
A. Colombini, G. Paulon – Danieli, Italy

10:50  coffee break

ELECTROMAGNETIC DEVICES

11:10  CC_065 - Experimental investigation of the flow in the mold of a liquid metal model for continuous casting under the influence of electromagnetic fields
D. Schurmann, I. Glavinić, B. Willers, K. Timmel, S. Eckert - Helmholtz-Zentrum Dresden-Rossendorf e.V., Dresden, Germany

11:30  CC_023 - Effect of static magnetic field on solidification microstructure of Sn-Zn alloy
T. Odagaki - JFE Steel Corporation, Japan

11:50  CC_107 - Numeric simulation of electromagnetic linear stirring for continuously cast steel slabs
M. Barna - Johannes Kepler University Linz, Austria

12:10  CC_014 - Numerical simulation of dendritic grain transport in molten steel with EMS
P. Wang, S. Luo, W. Wang, M. Zhu - Northeastern University, Shenyang, China

12:30  CC_190 - Application of Linear Electromagnetic Stirrer (LES) to decrease the central macrosegregation affecting the billets
C. Mapelli, S. Barella, D. Mombelli, A. Gruttadaura - Politecnico di Milano, Italy
L. Angelini, C. Di Cecca, P. Frittella, F. Guerra - Feralpi Siderurgica, Italy
S. De Monte, C. Persi – Ergoline, Italy

12:50  CC_022 - Estimation of the temperature dependency of pure liquid metal viscosity with enthalpy change
N. Takahira - Nippson Steel, Japan

13:30  CLOSING REMARKS IN NICOLAUS ROOM
13:40  End of the Conference
8:15  **PLENARY LECTURE**

8:45  Break for changing rooms

**FRIDAY, 19 JUNE 2020**

**CIGNO ROOM (+2 FLOOR)**

**NUMERICAL SIMULATION IV**

9:10  **CC_141 - A novel industrial ready numerical modeling approach for continuous casting process**
P. Nazem Jalali, R. Safavi Nick - Swerim AB, Luleå, Sweden  
S. Mosbah - Think Solidification

9:30  **CC_070 - Improve cast product quality by numerical simulation: novelties for a quick and accurate prediction of soft reduction impact and microporosity formation**
O. Jaouen, F. Costes – TRANSVALOR, France

9:50  **CC_025 - Formation of W- and U-shape liquid core in continuously cast slab**
P. Lan, P. Wang, X. Chen, J. Zhang - University of Science and Technology Beijing, China

10:10 **CC_143 - Determination of final solidification end of continuously cast slab and its contribution to improving centerline segregation**
W. Wang, S. Luo, M. Zhu - Northeastern University, Shenyang China  
X. Cheng, J. Ma - Hebei Iron and Steel Group Co., Handan, China

10:30 **CC_029 - Effect of an accelerator ring in gas channel on migration behavior of droplets in the internal mixing air-mist nozzle**
Y. Li, Y. Zhou, C. Cheng, W. Wu, Y. Jin - Wuhan University of Science and Technology, China  
H. Sun - Foshan University, China

10:50  coffee break

13:30  **CLOSING REMARKS IN NICOLAUS ROOM**

13:40  **End of the Conference**
<table>
<thead>
<tr>
<th>Poster ID</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC_001</td>
<td>Improvement of work safety and reduction of environmental issues with</td>
<td>R. Knecht - Quaker Sales Europe B.V., Uithoorn, The Netherlands</td>
</tr>
<tr>
<td></td>
<td>fire resistant lubricants in steel plants</td>
<td></td>
</tr>
<tr>
<td>CC_009</td>
<td>Numerical simulation of fluid flow and lubricant powder behavior in</td>
<td>A. Meysami - Golpayegan University of Technology, Iran</td>
</tr>
<tr>
<td></td>
<td>steel continuous casting mold for improving of produced ingot</td>
<td></td>
</tr>
<tr>
<td></td>
<td>properties</td>
<td></td>
</tr>
<tr>
<td>CC_015</td>
<td>Inclusion composition control in molten steel by changing aluminum</td>
<td>M. Abe, A. Harada, Y. Watanabe, H. Yokoyama, M. Kamo - JFE Steel Corporation, Japan</td>
</tr>
<tr>
<td></td>
<td>addition timing</td>
<td></td>
</tr>
<tr>
<td>CC_027</td>
<td>Effect of nozzle injection mode on initial transfer behavior of a</td>
<td>P. Wang, L. Li, H-y. Tang, J-q. Zhang - University of Science and Technology Beijing, China</td>
</tr>
<tr>
<td></td>
<td>large continuously cast round bloom</td>
<td>D-t. Zhao, W-d. Liu, S-w. Wang - Shanxi Taigang Stainless Steel Co. Ltd., Taiyuan, China</td>
</tr>
<tr>
<td>CC_032</td>
<td>Study on improvement of billet quality of low carbon and high sulfur</td>
<td>J. Guo, X. Wan, Z. Liu - Baowu Group Guangdong Shaoguan Iron and Steel Co. Ltd., China</td>
</tr>
<tr>
<td></td>
<td>free cutting steel</td>
<td></td>
</tr>
<tr>
<td>CC_036</td>
<td>Study on microstructure and properties of advanced strength steel</td>
<td>H. Xu, W. Wang, C. Lu - Central South University, China</td>
</tr>
<tr>
<td></td>
<td>through compact strip production and strip casting technology</td>
<td></td>
</tr>
<tr>
<td>CC_047</td>
<td>Development of analysis technique for oxygen in steel – separation of</td>
<td>H. Hong, Y-B. Kang - Pohang University of Science and Technology, Korea</td>
</tr>
<tr>
<td></td>
<td>soluble and insoluble oxygen</td>
<td></td>
</tr>
<tr>
<td>CC_061</td>
<td>Investigation on different types of silver in cold rolled product</td>
<td>M.L. Saini, H. Basavarajappa, N. Achutha, K. Ravishekar, M. Devasish - JSW Steel Limited,</td>
</tr>
<tr>
<td></td>
<td>due to steel melting shop</td>
<td>Bellary, India</td>
</tr>
<tr>
<td>CC_064</td>
<td>Simulation of carbon injection during the tapping process in EAF</td>
<td>X. Wu, R. Zhu, C. Wei, K. Dong, Y. Peng - University of Science and Technology Beijing, China</td>
</tr>
<tr>
<td></td>
<td>steelmaking</td>
<td></td>
</tr>
<tr>
<td>CC_072</td>
<td>Time dependence hardness evolution related to the low temperature</td>
<td>L. Lai, C. Feng - KTH Royal Institute of Technology, Stockholm, Sweden</td>
</tr>
<tr>
<td></td>
<td>embrittlement of duplex stainless steels assisted by machine learning</td>
<td>H. Shibata, S. Sukenaga - Tohoku University, Japan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. Mu - KTH Royal Institute of Technology, Stockholm, Sweden and Tohoku University, Japan</td>
</tr>
<tr>
<td>CC_075</td>
<td>Investigation of slab mold metallurgical behavior under</td>
<td>P. Wang, X-q. Chen, H-y. Tang, J-q. Zhang - University of Science and Technology Beijing, China</td>
</tr>
<tr>
<td></td>
<td>electromagnetic rotating stirring for Interstitial-Free Steel</td>
<td>H. Xiao - University of Science and Technology Beijing, China and Hunan Zhongke Electric Co. Ltd., Yueyang China</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W-h. Li, B. Yi, H-y. Yao - Hunan Zhongke Electric Co. Ltd., Yueyang China</td>
</tr>
<tr>
<td>CC_106</td>
<td>Phase field &amp; Monte Carlo-Potts simulation of grain growth and</td>
<td>R. Strachan - University of Dundee, United Kingdom and Rautomead Ltd, Dundee, United Kingdom</td>
</tr>
<tr>
<td></td>
<td>morphology of vertically upwards cast oxygen free Cu</td>
<td>D.M. Mackie, J.B. Vorstius - University of Dundee, United Kingdom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M. Cooper, B. Frame - Rautomead Ltd, Dundee, United Kingdom</td>
</tr>
<tr>
<td>CC_110</td>
<td>Study on macro inclusion defects in continuous casting slabs by</td>
<td>G. Xu, Y. Shen, X. Ruan, Y. Fan - Baoshan Iron &amp; Steel Co. Ltd. Shanghai, China</td>
</tr>
<tr>
<td></td>
<td>planing experiment</td>
<td>Z. Liu, B. Li - Northeastern University, Shenyang, China</td>
</tr>
<tr>
<td>CC_114</td>
<td>Robotics applied to continuous casting operations</td>
<td>G. Maccani - BM Group Polytec, Borgo Chiese, Italy</td>
</tr>
</tbody>
</table>
CC_117 Remote controlled demolition robots in steel plant applications: a review aimed at health & safety aspects
C. Montorfano, R. Ruberto – Brokk Italia, Como, Italy
J. Furtenback - Brokk AB

CC_126 Influence of oxide scale formation on the surface quality of a HSLA steel during continuous
R.M. Pineda Huitron, E. Vuorinen - Luleå University of Technology, Sweden
P.E. Ramirez Lopez - SWERIM AB, Luleå, Sweden and Royal Institute of Technology (KTH), Stockholm, Sweden

CC_131 X-Pact® Level Control – Performance module for quality improvement
L. Schaps, R. Wilmès - SMS group GmbH, Germany

CC_136 Danieli FastCast Technology - effect on billet and bloom quality
A. Trisciuzzi, M.M. Motta - Danieli, Italy

CC_146 The effect of antioxidants on the internal oxidation behaviors in two high alloy steels
D-W. Lee, Y-U. Heo, C-H. Yim, J-S. Lee - POSTECH GIFT, Korea
U-H. Lee, J-K. Choi - POSCO Research Laboratory, Korea

CC_148 Tundish process: function and characteristic of tundish for continuous improvement clean steel
N. De Biasio - Italy

CC_163 Analysis of the advantages offered by RHI Magnesita’S GYRONOZZLE for round bloom continuous casting
I. Alonso - Sidenor I+D, Spain
G. Hackl, M. Kumar, Y. Tang - RHI Magnesita

CC_172 Improve slab quality for plate mill
A.M. Costa - Gerdau Ouro Branco, Brazil

CC_176 Zero waste approach using fast cooled ladle slag and MgO refractory bricks by fully recycling in the EAF process
G. Ferlinghetti, S. Miani - STEB srl, Corzano, Italy

CC_178 Predictive Maintenance using real time sensor data
I. Griffiths - University of South Wales, United Kingdom

CC_183 Development of Intermix Practice at Vallourec’s Continuous Casting
M. Modesto, O. Ferreira, L.C. Germano, G. Gomes, T. Oliveira, L. Chessaret - Vallourec Soluções Tubulares, Brasil
C.A. da Silva - Federal University of Ouro Preto, Brazil

CC_198 Determination of boundary conditions and material properties for a transient 2.5D- solidification model for slab casting
L. Preuler - K1 MET GmbH, Linz, Austria
M. Bernhard, C. Bernhard - Montanuniversitaet Leoben, Austria
S. Ille - voestalpine Stahl GmbH, Linz, Austria

POSTERS WILL BE DISPLAYED FOR THE ENTIRE PERIOD OF THE CONFERENCE

NOTE OF THE PROGRAMME
This programme is not definitive and it may be slightly modified: title and authors, cancelled or added papers, chairperson, timetable or duration, etc. Possible changes in the programme will be communicated before the beginning of the Conference.
GENERAL INFORMATION

CONFERENCE VENUE
The Conference will be held in Bari – Italy, at Nicolaus Hotel, in via C.A. Ciasca 27
Website: https://www.thenicolaushotel.com/

LANGUAGE
The official language of the Conference will be English.

PROCEEDINGS
The full text of the accepted papers will be published in the electronic proceedings and issued to attendees on arrival at the Conference. Certain papers may be considered for publication in the AIM Journal La Metallurgia Italiana – International Journal of the Italian Association for Metallurgy, which is covered in the Science Citation Index Expanded by Thomson Reuters and in Scopus by Elsevier B.V.

ACCOMMODATION
An allotment of rooms has been reserved for participants of the ECCC 2020 Conference at Nicolaus Hotel, in via C.A. Ciasca 27.
For booking, click here: https://www.thenicolaushotel.com/lp/mice-eccc/

REGISTRATION INFORMATION

REGISTRATION FEES - All registration fees are Revenue Stamp included

<table>
<thead>
<tr>
<th>Early Registration Fees</th>
<th>AIM Member</th>
<th>Non Member</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By April 30, 2020</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker (Presenter) (by February 28, 2020)</td>
<td>€ 580,00</td>
<td>€ 690,00</td>
</tr>
<tr>
<td>Session Chairperson (by June 8, 2020)</td>
<td>€ 580,00</td>
<td>€ 690,00</td>
</tr>
<tr>
<td>Committee Member (by June 8, 2020)</td>
<td>€ 580,00</td>
<td>€ 690,00</td>
</tr>
<tr>
<td>Delegate (non-presenter)</td>
<td>€ 740,00</td>
<td>€ 850,00</td>
</tr>
<tr>
<td>Exhibitor / Sponsor</td>
<td>€ 640,00</td>
<td>€ 750,00</td>
</tr>
</tbody>
</table>

Regular Registration Fees

<table>
<thead>
<tr>
<th>Regular Registration Fees</th>
<th>AIM Member</th>
<th>Non Member</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>After April 30, 2020</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delegate (non-presenter)</td>
<td>€ 790,00</td>
<td>€ 900,00</td>
</tr>
<tr>
<td>Exhibitor / Sponsor</td>
<td>€ 700,00</td>
<td>€ 810,00</td>
</tr>
</tbody>
</table>

For non-members the fee includes AIM Membership for the second semester of 2020 and for the year 2021.
STUDENT REGISTRATION FEES *

STUDENT REGISTRATION FEES ARE VAT INCLUDED

* EITHER DELEGATE OR SPEAKER

<table>
<thead>
<tr>
<th>EARLY REGISTRATION FEE</th>
<th>€ 390.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGULAR REGISTRATION FEE</td>
<td>€ 430.00</td>
</tr>
</tbody>
</table>

Registration for speaker is due by February 28, 2020

STUDENTS WILL HAVE TO PROVIDE VALID PROOF OF STUDENT STATUS.
The CONFERENCE DINNER ON JUNE 18, 2020 IS NOT INCLUDED IN THE STUDENT REGISTRATION FEE

CONFERENCE REGISTRATION FEES INCLUDE

• ADMITTANCE TO TECHNICAL SESSIONS AND TO THE EXHIBITION
• CONFERENCE BAG WITH ELECTRONIC PROCEEDINGS
• CONFERENCE DINNER ON JUNE 18 (NOT INCLUDED IN THE STUDENT REGISTRATION FEE)
• COFFEE BREAKS
• LUNCHES

ADDITIONAL TICKET FOR CONFERENCE DINNER FOR ACCOMPANYING PERSON: € 122

(VAT included) (INCLUDES ONLY THE CONFERENCE DINNER ON JUNE 18)

PAYMENT AND REMITTANCE

• BY BANK TRANSFER, TO THE ORDER OF ASSOCIAZIONE ITALIANA DI METALLURGIA - AIM
  AT “UBI BANCA S.P.A.”, BRANCH NO. 2 - VIA BORGOGNA, 2/4 - 20122 MILANO - ITALY,
  ACCOUNT NO. 000000002325 - COD. ABI 03111 - CAB 01604 - CIN O,
  IBAN: IT49003110160400000022325, SWIFT CODE BLOPIT22.
  A COPY OF THE TRANSFER ORDER MUST BE SENT TO AIM, TOGETHER WITH THE REGISTRATION FORM.
• BY CREDIT CARD ONLINE (WWW.AIMNET.IT/ECCC2020).

SPEAKERS REGISTRATION

PLEASE BE AWARE THAT ONLY PAPERS SUBMITTED ON TIME AND WITH PRESENTING AUTHOR REGULARLY
REGISTERED (REGISTRATION FEE PAID) BEFORE FEBRUARY 28, 2020 WILL BE INCLUDED IN THE FINAL
PROGRAMME AND PUBLISHED IN THE CONFERENCE PROCEEDINGS. REGISTRATION FORMS WILL NOT BE
PROCESSED WITHOUT PAYMENT. A MAXIMUM OF TWO PAPERS WILL BE ACCEPTED FOR EACH AUTHOR
REGISTERED IN TIME.

SPEAKERS CANCELLATION AND REFUND POLICY

A REFUND, LESS 20% DEDUCTION FOR ADMINISTRATIVE COSTS, WILL BE ISSUED FOR WRITTEN
CANCELLATIONS RECEIVED BEFORE FEBRUARY 28, 2020. FOR SPEAKERS WHO NOTIFY THEIR
CANCELLATION AFTER FEBRUARY 28, 2020 OR WHO 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.
ADVANCED REGISTRATION
If you plan to attend, please register online on the Conference website www.aimnet.it/eccc2020 or fill in the enclosed Registration Form and send it to the Organising Secretariat best before April 30, 2020 (Early-bird registrations deadline). Please use a separate form for each participant. Please contact the Organising Secretariat by e-mail, if possible.

CANCELLATION AND REFUND POLICY
A refund, less 20% deduction for administrative costs, will be issued for written cancellations received by April 30, 2020. For attendees who notify their cancellation after April 30, 2020 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.

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.

VISA APPLICATION FORM
If you need and official invitation please send your request to the Organising Secretariat best before May 22, 2020 complete with: • family and first name, • Mr/Mrs, • birth date, • passport number, • arrival and departure dates, • nationality and • fax number of the Italian Embassy for your country.

EXHIBITION & SPONSORSHIP OPPORTUNITIES
As an integral element of the event, a technical exhibition will be held during the event. Companies have the opportunity to reinforce their participation and enhance their corporate identification by taking advantage of the benefits offered to them as sponsors of the event. Companies interested in exhibiting at and/or sponsoring the event may contact commerciale@siderweb.com or visit the Conference website “Exhibition and Sponsoring”

MOBILE/CELL PHONE
Mobiles must be kept turned off or in silent mode in all Conference rooms.

SOCIAL PROGRAMME
In order to give delegates the opportunity to meet informally and enjoy Bari’s atmosphere, AIM organized a Conference dinner in the evening of June 18, 2020. The Conference dinner will be held at Sala ZONNO - Molo san Nicola, 3 in Bari. (Dress code: business casual). A transfer service to the dinner venue and back will be provided.