



Proceedings

3rd International Steel Conference on
New Developments in Metallurgical
Process Technologies

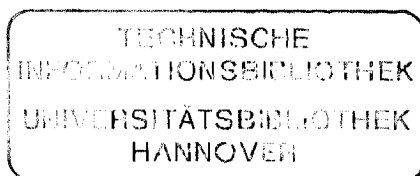


Table of contents

Fundamentals in ironmaking

Session 1

Isothermal gaseous reduction of nanocrystallites Fe_2O_3 at 450 °C – 600 °C	1
<i>M. Bahgat, M. I. Nasr, Central Metallurgical Research and Development Institute, M. H. Khedr, I. M. Sedik, Benisuef University, Egypt</i>	
Combined reduction of manganese ore and iron ore and application in the direct and smelting reduction for producing novel high manganese steels	8
<i>K. Ohler-Martins, E. Gorbunova, D. G. Senk, RWTH Aachen University, Germany</i>	
Rapid reduction of spherical wustite fine particle transported with CH_4 gas	16
<i>K. Ohno, N. Takeuchi, Y. Nomura, T. Maeda, K. Nishioka, M. Shimizu, Kyushu University, Japan</i>	
Measurements in iron and steel metallurgy at IEHK Aachen	24
<i>D. G. Senk, A. Babich, S. Sandlöbes, H. W. Gudenau, RWTH Aachen University, Germany</i>	
Modeling of the heat losses at the liquid metal transport in an integrated iron and steel works	32
<i>A. Ivanescu, A. Ene, V. Munteanu, L. Ivanescu, Dunarea de Jos University of Galati, Romania, D. Zorlescu, Mittal Steel Galati, Romania</i>	
Method and results of numerical modeling of physico-chemical processes in radial annular cross-sections along the blast furnace height	39
<i>Y. M. Gordon, Hatch, Mississauga, Ontario, Canada, I. G. Tovarovskiy, V. I. Bolshakov, Iron & Steel Institute of National Academy of Science, Ukraine</i>	
Three-dimensional mathematical simulation of iron and slag drainage behavior in blast furnace hearth	47
<i>K. Nishioka, T. Maeda, M. Shimizu, Kyushu University Japan</i>	

Trial with low slag volume at LKAB experimental blast furnace	55
<i>P. Sikstrom, C. Brandell, LKAB,</i>	
<i>B. Sundelin, SSAB Oxelosund, Sweden</i>	

Basic oxygen steel converter and secondary metallurgy – degassing and vacuum	Session 2
---	------------------

Results after 5 years of experience with RH Degasser No. 2	63
<i>I. Knopp, H. Liebig, C.-H. Schütz, ThyssenKrupp Steel, Germany</i>	

State-of-the-art technology in secondary metallurgy	71
<i>R. Fandrich, H. B. Lungen, C.-D. Wuppermann,</i>	
<i>Steel Institute VDEh, Germany</i>	

Rolling & coating, measuring techniques	Session 3
--	------------------

High tech measuring technology as a condition for product quality and process stability	84
<i>R. Fackert, IMS Messsysteme, J. Polzer, U. Müller, A. Wolff, Betriebsforschungsinstitut (BFI), Germany</i>	

Measurement of thin oil layers on moving strip by ellipsometry	93
<i>W. Woeste, S. Krannich, H. Oberhoffer,</i>	
<i>Betriebsforschungsinstitut (BFI), Germany</i>	

Measurement and mapping of through thickness residual stresses in large steel rolling components	101
<i>F. Hosseinzadeh, X. Ficquet, D. J. Smith, C. E. Truman,</i>	
<i>University of Bristol, UK</i>	

EMG-eMASS – Homogeneous zinc layer and high production speed via an electromagnetic strip stabilization	109
<i>M. Irle, A. Jordan, EMG Automation, Germany</i>	

Measurement of manifested flatness of flat metal products	116
<i>P. Kierkegaard, C. Andin, Shapeline, Sweden</i>	

Pickling and cold rolling

Session 4

- Experiences with the new turnkey cold rolling complex with integrated 4-stand tandem mill and combined pickling line** 124
S. Lepeltier, P. Jonette, Vega do Sul, Arcelor, Brazil
- Siemens VAI tomorrow's high productivity pickle line** 132
J. Leroyer, Siemens VAI Clecim, France
- KT Mill (kobe twelve-high cold rolling mill) for ultra thin stainless steel foil** 137
K. Uesugi, Kobe Steel, Japan
- Use of digital simulation to design and develop width notch compensation to eliminate weld breaks for a continuous cold mill** 144
W. P. Umlauf, Mittal Steel, G. A. Rymsza, I/N Tek, USA
- Influence of rolling lubrication on self-excited vibration in 1420 continuous cold rolling mill** 152
L. Q. Wei, Z. Qu, X.-Y. Zhang, M.-Y. Liu, Shanghai Institute of Technology, K.-J. Wang, Y.-H. Xu, X.-W. Ye, Shanghai Baoshan Iron & Steel Co., China

Basic oxygen steel converter and secondary metallurgy – process control

Session 5

- VAI-CON Tap – The missing link in converter steelmaking** 160
R. Hubner, K. Herzog, G. Staudinger, P. Juza, Siemens VAI Metals Technologies, Austria
- Through process dynamic prediction of melt temperature evolution for optimised energy input and temperature control in oxygen steelmaking** 168
B. Kleimt, S. Zisser, Betriebsforschungsinstitut (BFI), M. Weinberg, J. Bongers, Hüttenwerke Krupp Mannesmann, Germany

Real-time furnace level measurement system improves CONARC process at Mittal Steel Saldanha	176
<i>J. van Wyk, N. Mintoor, Mittal Steel, P. Minnaar, Rolling Mill Supplies, South Africa, P. Bengtsson, A. Lyons , Agellis Group, Sweden</i>	

Near the shape casting and rolling **Session 6**

The Arvedi endless strip production line – ESP from liquid steel to hot-rolled coil in seven minutes	183
<i>G. Arvedi, F. Mazzolari, Finarvedi, A. Bianchi, Acciaieria Arvedi, Italy, G. Holleis, A. Viehböck, A. Angerbauer, Siemens VAI, Austria</i>	
Operational results of the 3rd generation CSP[®] plant at JISCO	192
<i>C. Chang, JISCO, China</i>	
The Castrip[®] Process: commercialized thin strip casting of steel	200
<i>F. Fisher Jr., W. Blejde, R. Mahapatra, Castrip, M. Schueren, P Campbell, G. McQuillis, Nucor Steel, USA</i>	

Hot rolling of heavy plates **Session 7**

Control of front end bending in heavy plate mills based on analytical models	208
<i>T. Kiefer, A. Kugi, R. Heeg, Saarland University, O. Fichet, B. Bödefeld, Dillinger Hüttenwerke, Germany, L. Irastorza, Dillinger Hütte, France</i>	
Practical results with the new heavy plate mill at Baosteel	216
<i>J. Yuan, Baosteel, China, G. Horn, SMS Demag, Germany</i>	
Model-based control of plate thickness in heavy plates mills	224
<i>R. Heeg, O. Fichet, B. Bödefeld Dillinger Hüttenwerke, Germany, T. Kiefer, A. Kugi, Saarland University, Germany, L. Irastorza, GTS Industries Group Dillinger Hütte, France</i>	

Improvement of plate flatness using flatness measurement system after hot leveller 232
C. S. Lee, S. R. Ryoo, Y.-J. Jung, E.-S. Sung, C.-J. Park, K. H. Kim,
Posco, Korea

Plate mill upgrades for high strength products 237
J. F. Evans, Siemens VAI Metals Technologies, UK,
P. Sopp, Siemens VAI Metals Technologies, Germany

Heavy plate leveler improvement by coupling a model to a flatness gauge 246
L. Bodini, S. Maillard, Siemens VAI, France, O. Ehrich, Thyssenkrupp Steel,
M. Krauhausen, NoKra Optische Prüftechnik und Automation, Germany

Reduction of cold leveling rate of high strength API-X70 252
K. H. Kim, E. S. Sung, C. J. Park, T. W. Lee, C. S. Lee, S. R. Ryoo,
Posco, Korea

Basic oxygen steel converter and secondary metallurgy – quality aspects **Session 8**

Market leadership in converter dry-dedusting 256
W. Fingerhut, Siemens VAI Metals Technologies, Austria

Some aspect of physical growth of non-metallic inclusion in ladle treatment 265
D. Sichen, Y. J. Kang, KTH Stockholm, Sweden,
B. Sahebkar, P. R. Scheller, TU Bergakademie Freiberg, Germany

Quality-assured production in the oxygen steelmaking plant in Linz 273
J. Lehner, K. Jandl, F. Kokert, W. Felberbauer, D. Hofer,
voestalpine Stahl, Austria, H.-J. Ponten, PSI BT, Germany

Alternative energy sources, CO₂ recovery technology and clean environment compliance – Integral components of HYL energiron technology	281
<i>J. Becerra, HYL Technologies, México, A. Martinis, Danieli & C., Italy</i>	
HBI production through coal-based direct reduction and its application in blast furnace	290
<i>H. Tanaka, T. Harada, Kobe Steel, Japan</i>	
Development of injection of reduction gas into the blast furnace shaft	298
<i>J. Buchwalder, J. Mernitz, Arcelor Eisenhüttenstadt, G. Harp, M. Hensmann, Betriebsforschungsinstitut (BFI), C. Reuther, M. Schingnitz, Siemens Fuel Gasification Technology, Germany</i>	
Agglomerated biomass char: A chance to reduce greenhouse gas emission in iron and steel industries	306
<i>S. H. Freitas Seabra da Rocha, RWTH Aachen University, Germany</i>	
Recent development in ironmaking technology toward reduction in CO₂ emission	314
<i>T. Anyashiki, I. Shimoyama, H. Fujimoto, S. Watakabe, T. Sato, K. Takeda, JFE Steel, Japan</i>	
Commissioning and first operational results of the new gas cleaning installation with the PAUL WURTH Entrained Flow Absorber (EFA) at ROGESA No. 3 sinter strand	322
<i>W. Hartig, M. Hoffman, Dillinger Hüttenwerke ROGESA, Germany, F. Reufer, H. Weissert, Paul Wurth Umwelttechnik, Germany</i>	
Operational experience with the new eposint gas recycling process	331
at sinter strand No. 5 of voestalpine Stahl in Linz <i>H.Schmid, W. Ehler, E. Zwittag, voestalpine Stahl, Austria</i>	
A new paradigm for pollution researches and capitalization of resources	339
<i>A. Nicolae, M. Nicolae, C. Predescu, M. Sohaciu, E. Matei, G. Calea, UPB Romania, S. Ilie, voestalpine Stahl, Austria</i>	

- Latest developments and benefits of single- and two-stand reversing cold mills** 347
J.-P. Robinet, B. Sokoloff, S. Martin, P. Gippet,
Siemens VAI Metals Technologies, France
- Wiping of oils and emulsion from steel strip in cold rolling mills** 356
J. Dedicova, J. Spacek, UVB TECHNIK, Czech Republic
- Study on forming mechanism of chatter marks on cold-rolled strip and preventing measures** 364
Z. Wang, P. Chen, Y. Zhang, Baoshan Iron & Steel Co., China
- The new high-performance electrolytic tinning line of Rasselstein GmbH VA 12** 371
T. Bohlmann, Rasselstein, R. Zerbe, SMS Demag, Germany
The full paper can be downloaded from 11 June 2007 until 31 August 2007 at www.insteelcon.com
Please click on „Download“. In order to log you in please type in the following username:
paperdownload and the password: insteelcon2007.
- DFI oxyfuel for 30% more galvanizing capacity and clean strip at ThyssenKrupp Steel, Fennetrop** 372
P. Vesterberg, O. Ritzén, Linde Gas, Sweden,
H. Eichelkraut, H.-J. Heiler, W. Högner, ThyssenKrupp Steel, Germany,
R. Paul, Linde Gas, Germany
- Modernizing automation and drives of the Baoshan Tandem Cold Mill No.1** 378
J. Hofbauer, T. di Paolo, Siemens VAI Germany
- How to get control systems working best: new ways to monitor and ensure peak control performance in steel processing** 385
M. Jelali, A. Wolff, M. Thormann, Betriebsforschungsinstitut (BFI), Germany,
P. Foerster, T. Müller, Arcelor, A. Metzul, A. Halswick, SMS Demag, Germany
- New temper rolling model for advanced evaluation of rollability** 394
K. Krimpelstaetter, G. Hohenbichler, G. Finstermann, Siemens VAI,
K. Zeman, A. Kainz, Johannes Kepler University, Austria

Electric arc furnaces – productivity and economic aspects

Session 11

- Single Bucket EAF with hot metal charging** 402
*G. Bünemann, P. Rivetti, A. Partyka, CONCAST, Switzerland,
J. Liu, Jiangsu Shagang Group, China*
- Economic incentives for a continuous steelmaking process** 410
G. Traquair, F. M. Wheeler, Y. M. Gordon, Hatch Canada
- Operating results of Goodfellow EFSOP® at Riva, Verona, Italy** 418
*N. Veneri, Riva Acciaio, D. Masoero, V. Scipolo, TenovaMetal Making, Italy,
M. Pozzi, J. Maiolo, Tenova Goodfellow, Canada*
- Best practice – Does productivity pay for it?** 426
*J. Greinacher, S. Baumgartner, M. Fleischer,
Badische Stahl-Engineering, M. Hamy, R. Ridder, Badische Stahlwerke, Germany*

Hot rolling of long products

Session 12

- Roller straightening process of rail profiles in aspect of
finite element method simulation** 434
A. Swiatoniowski, W. Boksa, University of Mining and Metallurgy, Poland
- Increase of grooved work roll life time by innovative
coolant and lubricant application** 441
*T. Reichardt, H. Deli, B. Schmidt, Betriebsforschungsinstitut (BFI),
S. Flügel, T. Lademacher, Mannstaedt-Werke, Germany*
- State of the art control technology for the new
structural beam mill at Chaparral Virginia** 447
D. Quesenbery, Chaparral, USA, B. Sainz, AMI GE, Mexico
- Modernization and integration of automation systems
into the bar mill of Georgsmarienhütte GmbH**456
H. Schliephake, K. Golinske, Georgsmarienhütte, Germany

Outline and operational results of a SBQ – rod and bar mill after the implementation of a 3-roll reducing & sizing block at Nucor-Norfolk Division	464
<i>D. Hopper, G. Moen, Nucor, USA, W. J. Ammerling, Kocks, Germany, S. A. Filippini, Kocks, USA</i>	
Spooling process for modern bar rolling	472
<i>R. Cardani, N. Redolfi, L. Giacomini, Siemens VAI, Italy</i>	
Ceramic rolling tools and components for enhanced lifetime and product quality	481
<i>K. Wiehler, Mittal Steel, A. Kailer, Fraunhofer-Institut für Werkstoffmechanik, P.-J. Mauk, Universität Duisburg-Essen, C. Eckardt, H.C. Starck Ceramics, K. Berroth, FCT Ingenieurkeramik, J. Kozlowski, TE-KO-WE, A. Wagemann, BeaTec, Germany, R. Danzer Montanuniversität Leoben, Austria</i>	
Adaptive dimension models for optimization of long products rolling	489
<i>A. Daneryd, M. G. Olsson, R. Lindkvist, ABB, Sweden</i>	
Cross country bar mill control modernization at Nucor Marion	496
<i>B. Sainz, AMI GE, Mexico, S. Swan, Nucor Marion, USA</i>	

Electric arc furnaces – injection practice and energy control

Session 13

The electric arc furnace of Tenaris Dalmine: From the application of the new technologies of digital electrode regulation and multipoint injection to the dynamic control of the process	504
<i>F. Memoli, Tenova Metal Making, P. Giugliano, L. Ferro, P. Galbiati, Tenaris Dalmine, C. Giavani, Tenova Melt Shops, J. Maiolo, Italy, Tenova Goodfellow, Canada</i>	
Holistic control of EAF's energy and material flows	513
<i>M. Dorndorf, K. Krüger, University of the Federal Armed Forces Hamburg, W. Wichert, Lech-Stahlwerke, M. Schubert, J. Kempken, SMS Demag, Germany</i>	

**The practice of carbon Injection and post combustion
in order to achieve a metallic yield recovery in the
electric arc furnace: the experience of Amsteel Mills (Malaysia)** 521
*F. G. Loh, C. K. Pong, W. M. Cheong, Amsteel Mills SDN BHD, Malaysia,
 F. Memoli, Tenova Metal Making, Italy, O. Negru, Tenova Goodfellow, Canada*

**Ultimate and RCB process performance technology —
Superior solutions for increasing EAF productivity** 530
M. Abel, M. Hein, Siemens VAI Metals, Germany

A New closed-loop control for DC-EAF 538
A. Treppschuh, K. Krueger, R. Kuehn, Georgmarienhütte, Germany

Blast furnace coke, ferrous burden and charging Session 14

**Strategies to increase the technical and economic efficiency of the blast furnace
ironmaking process by using new advanced cokemaking technologies** 546
G. Nashan, International cokemaking, Germany

The new coke oven battery “B3” at Arcelor Méditerranée 555
S. Pivot, R. Loddo, A. Storace, Paul Wurth Italia, Italy

Advanced coking technologies 562
M. Reinke, R. Worberg, Uhde, Germany

**Operation of coke making increasing
non-coking-coal ratio at Posco** 570
H. Lim, Posco, Korea

Increasing technical appeal of pellets use in blast furnace 578
*J. Murilo Mourão, P. Nogueira, F. M. Mayrink, R. Carneiro,
 Companhia Vale do Rio Doce (CVRD), Brazil*

Improving sinter reducibility at sinter plant No. 3 – Tata Steel's experience 586
S. Sinha, Tata Steel India

Increase of productivity in sinter plant AHMSA 595
*R. Martinez Sanchez, V. M. Narváez Garcí'a, R. P. Rodriguez,
 F. F. Gutierrez Ramirez, AHMSA, Mexico*

Investigation of the effect of burden properties on blast furnace performance – A Sumitomo’s approach	602
<i>Y. Ujisawa, K. Nakano, Y. Matsukura, K. Sunahara, T. Yamamoto, Sumitomo Metal Industries, Japan</i>	
Contemporary blast furnace top charging practices	610
<i>J. Buchwalder, Arcelor, Germany,</i>	
<i>R. Goffin, G. Thillen, E. Lonardi, Paul Wurth, Luxembourg,</i>	
<i>V. A. Dobroskok, Moscow State Institute of Steel & Alloys, Russia</i>	
 Continuous casting – tundish, clogging, inclusion formation	Session 15
 Inclusion band formation in continuous casting: Influence of geometry and process parameters	618
<i>M. Javurek, Johannes Kepler University, K. Mörwald, Siemens VAI, Austria</i>	
 Plasma heater of Nippon Steel engineering “NS-Plasma” for continuous caster	626
<i>M. Miyashita, S. Kittaka, S. Wakida, T. Sato, Nippon Steel Engineering, Japan</i>	
 Formation of Ar bubble and clogging mechanism in tundish nozzle controlled with sliding gate	634
<i>O.-D. Kwon, J.-M. Park, Posco, Korea</i>	
 Steel cleanliness control during continuous casting process	643
<i>Z. Lifeng, Norwegian University of Science & Technology (NTNU), Norway,</i>	
<i>L. Shihong, University of Science & Technology Beijing, China</i>	
 Hot and cold rolling materials	Session 16
 Effect of ROT cooling pattern on the microstructures of the hot-rolled high carbon steel strip	651
<i>J.-H. Ryu, J.-D. Lee, Posco, Korea</i>	
 Material behaviour: Local use of the bake hardening effect	658
<i>H. Palkowski, A. Brück, TU Clausthal, Germany</i>	

Bake-hardening effects in multiphase steels	666
<i>W. Bleck, S. Brühl, RWTH Aachen University, Germany</i>	
Formable ultra high-strength TRIP-aided cold rolled sheet steels with bainitic ferrite and/or martensite matrix structure	674
<i>K. Sugimoto, M. Murata, Shinshu University, Japan,</i>	
<i>Y. Mukai, Kobe Steel, Japan</i>	
Siemens VAI's fully integrated hot-strip mill for the production of high-strength steel and advanced steel grades	682
<i>A. Angerbauer, L. Gould, B. Haring, T. Kraxberger, F. Reiter,</i>	
<i>Siemens VAI Metals Technologies, Austria</i>	
Development of TWIP steel for automotive application	691
<i>O. Kwon, S. Kim, J. Cho, W. Kwak, G. Kim, Posco, Korea</i>	
 Hot rolling of strip	 Session 17
Temperature models for cooling trajectory control of strip and plate products	699
<i>C. Fryer, P. McNutt, B. Lawrence, Converteam, UK</i>	
Extension of Outokumpu hot rolling mill	707
<i>P. Saxlund, Outokumpu Stainless, Finland</i>	
Application of a genetic algorithm to roll profile prediction model in hot strip rolling	714
<i>J. Chung, J. You, M. Cho, H. Park, K. Shin. Posco, Korea</i>	
Online application of friction-based roll force models in hot strip rolling	721
<i>Y. Li, C. Fryer, A. Randall, Converteam, UK</i>	
Offline calibration and online adaptation of a new profile and flatness control system	729
<i>M. Miele, F. Schmid, Siemens VAI Metals Technologies, Germany</i>	

Continuous casting – mould and electromagnetic stirring **Session 18**

Electromagnetics give superior slab quality 736

H. R. Hackl, A. F. Lehman, J. E. A. Eriksson, S. G. Kollberg, ABB, Sweden

**High casting capacity with spray cooled molds
on the billet casters at BSW** 744

A. Volkert, S. Kromer, Badische Stahl-Engineering, Germany

Technologies for casting crack-prone steel grades 752

*H.-G. Wobker, D. Kolbeck, G. Hugenschütt, H.-D. Piwowar, L. Schmitz,
KM Europa Metal, P. Müller, Salzgitter Fachstahl, Germany*

**Improvement of product quality by optimized process control
in a slab casting mould** 760

*J.-F. Holzhauser, H.-H. Ballewski, ThyssenKrupp Nirosta,
R. Striedinger, S. Rödl, Betriebsforschungsinstitut (BFI), Germany*

**Near to round billet casting –
first experience at Mittal Steel Ruhrort** 769

*M. Lüttenberg, D. Kirsch, Mittal Steel, Germany,
A. Röhrig, Franz Kawa, Concast, Switzerland*

Hot rolling – furnace technology and scale behaviour **Session 19**

**State-of-the-art oxyfuel solutions for reheating
and annealing furnaces in steel industry** 777

*A. Scherello, Gaswärme-Institut, W. Högner, ThyssenKrupp Steel, Germany,
E. Claesson, Ovako Steel, P. Bamforth, Outokumpu Stainless, Sweden,
C. Mercier, Ascométal, France*

**Construction of regenerative burner combustion
system reheating furnace in Indonesia** 784

*T. Matsanuga, Nippon Steel, Japan,
J. Welly, P.T. Gunung Garuda, Indonesia*

Nonlinear observer design for pusher-type reheating furnaces 791
*D. Wild, T. Meurer, A. Kugi, Saarland University,
O. Fichet, K. Eberwein, Dillinger Hüttenwerke, Germany*

**Development of a sophisticated descaling nozzle
with high erosion performance** 798
T. Nishiyama, Kyoritsu Gokin Co, K. Karube, JFE Steel, Japan

Scale development and behavior during hot rolling 806
*R. Kawalla, G. Krause, TU Bergakademie Freiberg,
F. Steinert, FNE Freiberg, Germany*

Blast furnace operation and ancillary facilities **Session 20**

Improvement in BF 5, the Ahmsa experience 814
Mata Esparza, J. A. Borrego, M. Villarreal, AHMSA, Mexico

**Tailor-made solutions for heat recovery systems for performance
optimisation of different hot stoves plants** 823
*F. Eschmann, S. Thaler, Paul Wurth, Germany,
T.-S. Kao, D.-Y. Chang, China Steel Corp., Taiwan, R.O.C.*

**A model based control algorithm to stabilise the thermal
state of a blast furnace** 831
A. Franzen, J. Janz, T. Buhles, J. Pufpaff, Arcelor, Germany

**Pneumatic transport evolution of the desulphuri-
zation stations in CSN's torpedo cars** 838
*R. S. Nadur Motta, C. M. Santos de Araújo, C. P. Neves,
W. de Andrade Filho, Companhia Siderúrgica Nacional (CSN), Brazil,
S. Pompev, CERA Systems*

**Electric arc furnaces – stainless steel production,
electrode systems** **Session 21**

APOLLO™ electrodes: a new system for arc furnaces 847
S. Alameddine, R. E. Smith, GrafTech, Switzerland

Carinox steelmaking plant – largest single stainless steel line 855
M. Hiebler, J. Krumenacker, H. Janesch, J. Steins, Siemens VAI, Austria

**The behaviour of the secondary metallurgy slag into the EAF.
How to create a good foamy slag with the appropriate basicity
using a mix of lime and recycled ladle slag as EAF slag former** 863
V. Sahajwalla, N. Saha-Chaudhury, University of New South Wales, Australia,
M. Guzzon, C. Mapelli, Politecnico di Milano, F. Memoli, Tenova Metal Making,
M. Pustorino, Tenova Melt Shops, Italy

Continuous casting technologies and quality issues **Session 22**

**Siemens VAI's next generation casting technology
for ultimate productivity and flexibility** 871
A. Flick, A. Jungbauer, O. Schulz, K. Mörwald, A. Bumberger,
Siemens VAI Metals Technologies, Austria

**The challenge of an ultra-wide slab technologies for an
optimal internal and surface quality** 879
S.Meilun, F. Ziwei, Z. Liu, S. Wang,
Anyang Iron & Steel Corporation, China

New sensor controls solidification process 887
I. Schubert, Engineering Partner, Germany

A hot tearing criterion for the continuous casting process 894
R. Pierer, S. Michelic, C. Bernhard, University of Leoben,
D. Chimani, Siemens VAI Metals Technologies, Austria

Hot and cold rolling – planning and scheduling **Session 23**

**Mathematical optimization of logistics processes
at the hot rolling mill of voestalpine Stahl GmbH in Linz, Austria** 902
C. Neuberger, PSI BT, Germany, G. Kager, voestalpine Stahl, Austria

ABB and IBM joint solution for dynamic production scheduling and execution in the metals industry	910
<i>P. Belli, J. Harsta, M. Kiener, ABB, Switzerland, J. R. Favilla Jr., IBM, USA</i>	
Planning CSP with PSImetals ALS	918
<i>T. Glaß, PSI BT, W. Runde, J. Neuer, SMS Demag AG, Germany</i>	
Advanced planning and scheduling solution for steel centers	923
<i>W. Rezig, L. Van Nerom, AIS, Belgium</i>	
Key performance indicators monitoring in cold rolling plants	931
<i>B. Gim bott, PSI BT, Germany</i>	
Implementation of best practices in maintenance and lubrication of the hot strip rolling mill at the Arcelor Mittal Steel Burns Harbor Plant	937
<i>G. J. Sedelmeier, Shell Global Solutions, S. L. Totten, Burns Harbor ISG LLC, USA</i>	

Blast furnace design, campaign and relining **Session 24**

The possibility of setting up a permanent lining for the prolongation of blast furnace campaign life	945
<i>S. Zhang, Wuhan Iron and Steel, China</i>	
On the interaction of blast furnace hearth lining and cooling concepts	954
<i>V. Hille, R. Hebel, Paul Wurth, Germany</i>	
Continuous assessment of liquid iron filling levels and position of dead man within the blast furnace hearth by enhanced EMF measurement	962
<i>H.-P. Rüter, M. Peters, P. Schmöle, ThyssenKrupp Steel, O. Mielenz, H. Köchner, Betriebsforschungsinstitut (BFI), Germany</i>	
Long time experience with hearth lining concepts	970
<i>J. Pethke, Salzgitter Flachstahl, R. Hebel, Paul Wurth, Germany</i>	
The full paper can be downloaded from 11 June 2007 until 31 August 2007 at www.insteelcon.com .	
Please click on „Download“. In order to log you in please type in the following username: paperdownload and the password: insteelcon2007.	

Application of copper staves to an evaporative cooling system of a russian blast furnace	971
<i>C. Schauer</i> , Paul Wurth, Luxembourg, S. Filatov, S. Fedotov, NTMK, Russia, V. Kitchenko, A.L. Kanevsky, PI "Energostal", D. Stalinsky, A. Scoromnyi, "Energostal", Ukraine	

Upgrading of the TATA Steel "G" blast furnace: design concept, project development and operating results	979
<i>D.N. Jha</i> , V.K. Sinha, TATA Steel, India, C. Castagnola, R. Cirelli, Paul Wurth Italia, Italy	

Direct and smelting reduction Session 25

The influence of high accuracy raw materials feeds on future developments in the iron industry	987
<i>M. Chisholm</i> , D. Anderson, W. Siniscalco, J. Gaskell, Clyde Materials Handling, UK	

The full paper can be downloaded from 11 June 2007 until 31 August 2007 at www.insteelcon.com.

Please click on „Download“. In order to log you in please type in the following username:

paperdownload and the password: insteelcon2007.

Ironmaking in blast furnace and direct reduction shaft furnaces – Mittal Steel's experience of cross fertilization of innovation	988
<i>G. Tsvik</i> , P. Chaubal, A. Farhadi, D. Huang, Arcelor Mittal, USA	

n update on FINEX® technology development	996
<i>. Schenk</i> , C. Böhm , Siemens VIA, Austria, C.-O. Kang, H.-G. Lee, S. Joo, Posco, Korea	

Tecnored ironmaking process – Technology overview	1003
<i>J. H. Noldin Jr.</i> , Tecno-Logos, J. C. D'Abreu, H. M. Kohler, Catholic University of Rio de Janeiro, Brazil	

Recycling of waste materials Session 26

Agglomeration of steelmaking residues and the implication of its use in blast furnace and direct reduction processes	1011
<i>S. H. Freitas Seabra da Rocha</i> , RWTH-Aachen University, Germany	

Rotary hearth furnace for recycling dust and sludge	1019
<i>T. Ibaraki, H. Oda, S. Shima, H. Ichikawa, Nippon Steel, Japan</i>	
Recycling residues to metals	1027
<i>P. C. Guillaume, G. Devos, J.-L. Roth, Paul Wurth, Luxembourg</i>	
The appraisal of strength properties of pellets from the blast-furnace mud	1035
<i>A. V. Izheyev, S. S. Kamilovitch, B. V. Abdraschitovich,</i>	
<i>Magnitogorsk State Technical University,</i>	
<i>T. J. Aleksandrovich, O. A. Aleksandrovich, Magnitogorsk GIPROMEZ,</i>	
<i>G. M. Fydorovitch, G. V. Aleksandrovich, Magnitogorsk Iron and Steel Works, Russia</i>	
Waste plastics as reducing agent in the blast furnace process – Synergies between industrial production and waste management processes	1038
<i>T. Buergler, G. Brunnbauer, G. Pillmair, A. Ferstl,</i>	
<i>voestalpine Stahl, Austria</i>	
Paul Wurth technologies for the optimum recycling of steelmaking residues	1045
<i>T. Hansmann, P. Fontana, A. Chiappero, Paul Wurth Italia, Italy</i>	
<i>I. Both, J.-L. Roth, Paul Wurth, Luxembourg</i>	
Treatment and reuse technology for oily residues in blast furnace operation	1053
<i>C. Feilmayr, T. Buergler, G. Brunnbauer, G. Pillmair,</i>	
<i>H. Nograttig, G. Unterweger, voestalpine Stahl, Austria</i>	