



VENICE (ITALY)

20-22 MAY 2015

European Conference on Heat Treatment 2015 & 22nd IFHTSE Congress Heat Treatment and Surface Engineering From tradition to innovation



Final Programme & Exhibition Catalogue

Organised by



**Associazione
Italiana
di Metallurgia**



In cooperation with



Event no. 395
of the EFC





TIME TABLE

Tuesday, 19 May 2015

17.00
18.30

OPENING
OF THE REGISTRATION

Wednesday, 20 May 2015

8.00

Registration

ROOM A

9.30

OPENING SESSION

10.00

Keynote Lecture

10.45

OPENING OF THE EXHIBITION

and Coffee break

ROOM A

11.10

Massive heat treatments: microstructural
properties and transformations

ROOM B

Tool Steels

12.50

Lunch

14.10

Massive heat treatments: relationship
between process and final properties

Quenching and heat transfer

15.30

coffee break

15.50

Nitriding and nitrocarburizing
Application and combined processes

Quenching media and process

17.30

END OF THE FIRST DAY

Thursday, 21 May 2015

ROOM A

9.00

Massive heat treatments
of special components

ROOM B

Industrial heat treatment equipment
and process innovation

10.40

coffee break

11.10

Quality and accreditation

Industrial heat treatment equipment
and process innovation

12.50

Lunch

14.00

Stainless steels

Applications

16.00

coffee break

16.20

Carburizing processes and properties

Non ferrous processes and properties

ROOM A

17.40

Keynote lecture

18.15

END OF THE SECOND DAY

19.00

Social event

Friday, 22 May 2015

ROOM A

9.00

Nitriding and nitrocarburizing
Application and combined processes

ROOM B

Coatings properties and characterization

10.20

coffee break

10.50

Coatings processes and applications

Industrial heat treatment process and simulation

ROOM A

12.30

Closing Ceremony and presentation of the Tom Bell Young Author Award

12.50

Announcement of the 23th IFHTSE Congress and European Conference on Heat Treatment 2016

13.05

END OF THE CONFERENCE

The long-standing co-operation between **AIM - Associazione Italiana di Metallurgia** - and the **IFHTSE** – International Federation for Heat Treatment and Surface Engineering - has already led to the joint organisation of significant events, such as the Congresses held in Florence in 1982 and in 1998 and the Congress on automotive applications organised in Riva del Garda in 2005. Now, the combined efforts will be focused on the organisation of a Conference dealing with tradition and innovation in heat treatment and surface engineering.

The Conference joins the European Conference on Heat Treatment 2015 and the 22nd IFHTSE Congress.

The Conference brings together managers, engineers and researchers from heat treatment shops, tool makers and users, suppliers of heat treatment and surface engineering plant and equipment, as well as material scientists, creating a unique exchange opportunity at an international level among the numerous experts involved in the heat treatment and surface engineering route.



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Tuesday, 19 May 2015

17.00/18.30 **Opening of the registration**

Wednesday, 20 May 2015

8.00 **Registration**

ROOM A

OPENING SESSION

9.30 **Welcome addresses by:**

Reinhold Schneider, *IFHTSE President*

Danilo Petta, *AIM Heat Treatment & Metallography Study Group President*

9.45 **Presentation of IFHTSE-Fellowship to**

Dr. Herwig Altena

Prof. Arkadii Tikhonov

Dr. Robert Wood

10.00 **Keynote lecture**

Determination of the degree of thermal exposure to the lower head of the Three-Mile Island Unit 2 nuclear reactor using metallography

G.F. Vander Voort - *Struers Inc., Wadsworth, USA*

10.45 **OPENING OF THE EXHIBITION**

Coffee break

ROOM A

MASSIVE HEAT TREATMENTS: MICROSTRUCTURAL PROPERTIES AND TRANSFORMATIONS

Chairperson: **Mario Cusolito** - *Rodacciai*

11.10 **Austempering kinetics of a ductile iron**

M. Pellizzari, C. Menapace, G. Straffelini, M. Cazzolli, M. Dal Molin - *Università di Trento, Italy*

F. Vettore, E. Veneri - *Zanardi Fonderie, Minerbe, Italy*

11.30 **The effect of niobium on the microstructure and phase transformation kinetics in low-carbon medium manganese steels**

P. Peißl, R. Schneider, M. Rahofer, L. Samek - *University of Applied Sciences Upper Austria, Wels*

E. Arenholz - *voestalpine Stahl GmbH, Linz, Austria*

11.50 **Investigation of phase transformations in steel using fast in-situ x-ray diffraction (iXRD)**

A. Kopp, T. Bernthaler, G. Ketzer-Raichle, G. Schneider - *Aalen University, Germany*

D. Schmid - *DSeTec GmbH & Co. KG, Munich, Germany*

12.10 **Non-destructive in situ monitoring of the microstructural development in high performance steel components during heat treatment**

O. Bruchwald, W. Frackowiak, W. Reimche, H.J. Maier - *Leibniz Universität Hannover, Germany*

12.30 **Investigation of martensite formation in Fe based alloys during heating from boiling nitrogen temperature**

M. Villa, T.L. Christiansen, M.F. Hansen, M.A.J. Somers - *Technical University of Denmark, Lyngby, Denmark*

12.50 **Lunch**



Wednesday, 20 May 2015

ROOM A

9.30 OPENING SESSION

10.00 Keynote Lecture

10.45 OPENING OF THE EXHIBITION

Coffee break

ROOM B

TOOL STEELS

Chairperson: **Donato Firrao** - *Politecnico di Torino*

11.10 Effect of deep cryogenic treatment on the properties of AISI M2 steel

R. Sola, G. Poli, S. Defanti, P. Veronesi - *Università di Modena e Reggio Emilia, Italy*

G. Parigi - *Stav, Barberino del Mugello, Italy*

11.30 Heat treatment of die casting aluminum dies: bainite or martensite which is the best vs. toughness?

A. Magnacca - *Bodycote, Italy*

B. Stauder - *Bodycote, France*

11.50 Diversifying the heat treatment possibilities of the high thermal conductivity tool steels for new technological perspectives of the material forming processes

I. Valls - *Rovalma S.A., Rubí, Spain*

12.10 Influence of deep cryogenic treatment routes on the mechanical behaviour of a Cr-Mo-V hot work tool steel

L.A. Alava, G. Artola, M. Muro - *IK4-Azterlan, Durango, Spain*

12.30 Effectiveness of deep cryogenic treatment in improving properties of tool steel

B. Podgornik, V. Leskovšek - *Institute of Metals and Technology, Ljubljana, Slovenia*

B. Zajec - *Hidria Rotomatika d.o.o., Spodnja Idrija, Slovenia*

S. Jacobson - *Uppsala University, Uppsala, Sweden*

12.50 Lunch



Wednesday, 20 May 2015

ROOM A

MASSIVE HEAT TREATMENTS: RELATIONSHIP BETWEEN PROCESS AND FINAL PROPERTIES

Chairperson: **Massimo Pellizzari** - *Università di Trento*

- 14.10 Dry austempering heat treatment process: Interactions between process parameters, microstructural and mechanical properties**
E. Dabrock, F. Sarfert - *Robert Bosch GmbH, Renningen, Germany*
L. Hagymasi, T. Krug - *Robert Bosch GmbH, Stuttgart, Germany*
E. Kerscher - *University of Kaiserslautern, Germany*
- 14.30 The microstructure and properties of direct quenched martensite subjected to both ultra slow coil tempering and conventional tempering cycles**
A. Saastamoinen, D. Porter - *University of Oulu, Finland*
P. Suikkanen - *SSAB Europe Oy, Finland*
- 14.50 Comparative impact behavior of O1 steel under quenching and tempering and austempering**
L. de C. F. Canale, J.E. Nucci, L.L.M. Albano - *University of São Paulo, São Carlos, Brazil*
J. Vatavuk - *Universidade Presbiteriana Mackenzie, São Paulo, Brazil*
G.E. Totten - *Portland State University, USA*
- 15.30** coffee break

NITRIDING AND NITROCARBURIZING – APPLICATION AND COMBINED PROCESSES

Chairperson: **Hans-Werner Zoch** - *Stiftung Institut für Werkstofftechnik*

- 15.50 Development of austenite-martensite and ferrite-austenite duplex microstructure upon nitriding Fe-Mn alloys**
S.R. Meka, A. Chauhan - *Max Planck Institute for Intelligent Systems, Stuttgart, Germany*
T. Steiner - *Max Planck Institute for Intelligent Systems, Stuttgart, Germany and Robert Bosch GmbH, Stuttgart, Germany*
E.J. Mittemeijer - *Max Planck Institute for Intelligent Systems, Stuttgart, Germany and University of Stuttgart, Germany*
- 16.10 Tribological performance of nitrocarburising: influence of the compound layer and interests of post-treatments**
P-F. Cardey - *CETIM, St.Etienne, France*
- 16.30 Future trends in low temperature thermochemical treatment of stainless steel**
T.L. Christiansen, K.V. Dahl, M.A.J. Somers - *Technical University of Denmark, Kongens Lyngby, Denmark*
- 16.50 Keys to low pressure nitriding**
M. Devienne - *Fours Industriels BML, St. Quentin Fallavier, France*
- 17.10 Influence of plastic deformation on low temperature surface hardening of austenitic and precipitation hardening stainless steels by gaseous nitriding**
F. Bottoli, G. Winther, T.L. Christiansen, M.A.J. Somers - *Technical University of Denmark, Lyngby*
- 17.30** END of the first day



Wednesday, 20 May 2015

ROOM B

QUENCHING AND HEAT TRANSFER

Chairperson: **Marina La Vecchia** - *Università di Brescia*

14.10 The DANIELI QST heat treatment: cooling characterization and microstructural evolution through the thickness of heavy products

N. Sartori, G. Luvarà - *Danieli Research Center, Buttrio, Italy*
F. Forno - *Danieli Morgårdshammar, Udine, Italy*

14.30 Cooling rates analysis for steel pipes industrial quenching processes

M. Bentivegni, T. Benard, T. Taisne, C. Zonco - *Vallourec Research Center, France*

14.50 Dependence of the local heat transfer coefficient on temperature and surface roughness in quenching steel parts in high efficiency quenching oil

K. Moch, S. Dietrich, V. Schulze - *Karlsruhe Institute of Technology (KIT), Germany*

15.10 Design of quenching units for heat treatment of tubes

M. Chabicovsky, J. Horsky, M. Raudensky, M. Hnizdil, P. Kotrbacek - *Brno University of Technology, Czech Republic*

15.30 coffee break

QUENCHING MEDIA AND PROCESS

Chairperson: **Danilo Petta** - *Geachem*

15.50 An examination of the ASTM D 6482 (Tensi Method) for evaluating polymer quenchants

D.S. MacKenzie - *Houghton International, Valley Forge PA, USA*

16.10 Control of polymer quenchants for increased life time and optimized maintenance

E. Troell, H. Kristoffersen, A. Stormvinter - *Swerea IVF, Mölndal, Sweden*

16.30 Influence of oil and polymer quenching on distortion of thin walled bearing rings

T. Wolfrath - *Fuchs Schmierstoffe GmbH, Mannheim, Germany*
T. Lübben, F. Frerichs - *IWT, Bremen, Germany*

16.50 Stabilization of vegetable oil-based quenchants to thermal-oxidative degradation: experimental strategy and effect of oxidation on quenching performance

E.C.A. Simêncio, R.L. Simencio Otero, L.C.F. Canale - *Universidade de São Paulo, São Carlos, Brasil*
G.E. Totten - *Portland State University, USA*

17.10 Substitution of quenching oils by waterbased polymer quenchants in the forging and steel industry

T. Beitz - *Petrofer Chemie, Hildesheim, Germany*
A. Vitali - *Petrofer Italia, Castel Mella, Italy*

17.30 END of the first day



Thursday, 21 May 2015

ROOM A

MASSIVE HEAT TREATMENTS OF SPECIAL COMPONENTS

Chairperson: **Reinhold Schneider** - *University of Applied Sciences Upper Austria*

- 9.00 Macro- and microscopic properties of gradient ultra-high-strength seamless steel tubes produced by dedicated thermo-mechanical treatments**
G. Winter, J. Klarner - *voestalpine Tubulars GmbH & Co KG, Kindberg, Austria*
B. Buchmayr, J. Keckes - *University of Leoben, Austria*
- 9.20 Process windows for shell hardening of unalloyed steel cylinders due to high speed quenching**
Th. Lübben, F. Frerichs - *Stiftung Institut für Werkstofftechnik (IWT), Bremen, Germany*
- 9.40 Deep cryogenic treatment and its influence on structure, mechanical properties and in-service life of high speed steel**
A. Ciski, T. Babul, J. Jeleńkowski - *Institute of Precision Mechanics, Warsaw, Poland*
- 10.00 Simulation of heat treatment of a mold for HPDC: cooling in gas or salt to get the best performance?**
A. Magistrelli, D. Mattavelli - *TTN, Italy*
P. Martelli, L. Valente - *Ecotre Valente, Italy*
- 10.20 Effect of thermomechanical treatment on the graphitization of hypoeutectoid steel with high silicon content**
H.J. Lee - *POSCO, Pohang, South Korea*
- 10.40** coffee break

QUALITY AND ACCREDITATION

Chairperson: **Bernard Vandewiele** - *BVDW Consultancy VOF*

- 11.10 Accreditation NADCAP**
E. Gianotti, A. Leone - *Trattamenti Termici Ferioli & Gianotti, Caselette, Italy*
- 11.30 Failure analysis of a high speed steel blanking mould machined by EDM**
S. Roggero, D. Franchi - *Trattamenti Termici Ferioli & Gianotti, Caselette, Italy*
D. Firrao - *Politecnico di Torino, Italy*
- 11.50 Strategies to optimise the mill and heat performance of a steel plant**
J. Hinton, A. Harvey - *Primetals Technologies Ltd., Sheffield, United Kingdom*
- 12.10 Carbonitriding "high nitrogen" - from concept to industrialisation – part II – furnace design and simulation**
A. Fleurentin - *Metallo Corner, Paris, France*
K-M. Winter - *Process-Electronic GmbH, Heiningen, Germany*
- 12.30 Retained austenite and residual stress: non destructive analysis by using X-Ray, ASTM 975-03 and UNI EN 15305**
L. Seralessandri, A. Torboli - *GNR, Agrate Conturbia, Italy*
- 12.50** Lunch



Thursday, 21 May 2015

ROOM B

INDUSTRIAL HEAT TREATMENT EQUIPMENT AND PROCESS INNOVATION

Chairperson: **Marco Farinet** - *Trafitec*

- 9.00 Process technology and plant design for bainite hardening**
H. Altena - *Aichelin Holding GmbH, Mödling, Austria*
K. Buchner - *Aichelin GesmbH, Mödling, Austria*
- 9.20 Lowering Exhaust gas losses and emissions with newly developed recuperative and regenerative burners**
J.G. Wuenning - *WS Waermeprozessestechnik GmbH, Renningen, Germany*
- 9.40 Distorsions point of view: process, fixtures and equipment**
V. Esteve - *ECM Technologies, Grenoble, France*
- 10.00 Advanced hot-zone and cooling gas stream design in vacuum furnaces for automotive applications**
B. Zieger, R. Stein - *SCHMETZ GmbH, Menden, Germany*
- 10.40** coffee break

INDUSTRIAL HEAT TREATMENT EQUIPMENT AND PROCESS INNOVATION

Chairperson: **Herwig Altena** - *Aichelin Holding GmbH*

- 11.10 Improvements on induction fixture hardening**
W. Goy, J. Kern - *EMA Indutech GmbH, Meckesheim, Germany*
- 11.30 Vacuum heat treatment systems for modern production strategies**
K. Löser, V. Heuer - *ALD Vacuum Technologies GmbH, Hanau, Germany*
- 11.50 Outstanding case hardening of Pyrowear® alloy 53 with LPC**
M. Korecki, M. Bazel, M. Sut - *SECO/WARWICK, Poland*
E. Wołowiec-Korecka - *Lodz University of Technical, Poland*
- 12.10 FEM-Supported development of single-shot hardening process for crank and camshafts**
A. Ulferts, F. Andrä - *Inductoheat Europe GmbH, Reichenbach, Germany*
V. Rudnev, C. Russel - *Inductoheat Inc., Madison Heights, USA*
- 12.30 High quality material for high temperature applications. Improvement of parts through the use of Sepcarb**
F. Guichard - *Herakles Safran Groupe, Le Haillan, France*
- 12.50** Lunch



Thursday, 21 May 2015

ROOM A

STAINLESS STEELS

Chairperson: **Valentina Vicario** - *Fomas Group*

- 14.00 Post weld heat treatment of martensitic stainless steel**
M. Pellizzari, C. Menapace - *Università di Trento, Italy*
N. Sartori, G. Luvarà - *Danieli Officine Meccaniche Research Centre, Buttrio, Italy*
G. Carnelutti - *Danieli Service, Buttrio, Italy*
- 14.20 Effect of ingot dimension on anisotropic behavior of a forged 17-4 PH steel used to produce steam turbine blades for power generation plants**
A. Lanzutti, L. Fedrizzi - *Università di Udine, Italy*
G. Lucacci - *C Blade, Maniago, Italy*
- 14.40 Microstructural characterization and layer stability of low-temperature carburized AISI 304L and AISI 904L austenitic stainless steel**
G. Maistro, L. Nyborg, Y. Cao - *Chalmers University of Technology, Gothenburg, Sweden*
S. Vezzù - *Veneto Nanotech, Venice, Italy*
- 15.00 Microstructural and phase ratio evolution of super duplex stainless steels during isothermal annealing at 1080°C**
A.F. Ciuffini, S. Barella, C. Di Cecca, A. Gruttadauria, C. Mapelli, D. Mombelli - *Politecnico di Milano, Italy*
- 16.00** coffee break

CARBURIZING PROCESSES AND PROPERTIES

Chairperson: **Luigi Cislaghi** - *T.T.N.*

- 16.20 Thermochemical treatments of alloys 16NiCrMo13 and 23MnCrMo5: the roles of carbon and nitrogen on metallurgical response to carbonitriding**
W. Dal Maz Silva, J. Dulcy, T. Belmonte - *IJL, Nancy, France*
- 16.40 Effect of Si concentration on the carbon concentration on surface layer after gas carburizing**
T. Koyama, M. Kubota, S. Yoshida - *Nippon Steel & Sumitomo Metal Corporation, Muroran, Japan*
- 17.00 Formation of fine and coarse grain layer by atmosphere control in case-hardening steel**
T. Ando, T. Morita, K. Inoue - *Daido Steel Co. Ltd., Nagoya, Japan*
- 17.20 Carbon potential controlled in direct gas carburizing using hydrocarbon and nitrogen with water vapour**
M. Okumiya, J.H. Kong, Y. Tsunekawa, I. Kondo - *Toyota Technological Institute, Nagoya, Japan*
M. Yamada, S. Simizu, S. Miura - *TOHO GAS Co., Ltd., Tokai, Japan*
- 17.40 Keynote lecture**
Consistency in different grain size measurement methods
G.F. Vander Voort - *Struers Inc., Wadsworth, USA*

18.15 END of the second day

19.00 Social event sponsored by





Thursday, 21 May 2015

ROOM B

APPLICATIONS

Chairperson: **Stefan Hock** - *IFHTSE*

- 14.00 The DANIELI Rail Head Hardening Technology "RH2" from laboratory scale to industrial production**
U. Saccoman, G. Luvarà, D. Andreatta - *Danieli Research Center, Buttrio, Italy*
L. Gori - *Danieli Morgårdshammar, Italy*
- 14.20 Yield stress evolution in Inconel 718 samples under standard heat treatment process conditions of turbine disks**
A. Drexler, E. Povodon-Karadeniz, H-P. Gänser, W. Ecker - *Materials Center Leoben Forschung GmbH, Leoben, Austria*
H. Maderbacher - *Montanuniversität Leoben, Austria*
B. Oberwinkler - *Böhler Schmiedetechnik GmbH & Co KG, Kapfenberg, Austria*
A. Fischersworing-Bunk - *MTU Aero Engines AG, Munich, Germany*
- 14.40 Improved properties of high strength 18Ni maraging steels for pushbelt CVT applications by optimization of alloy compositions and surface hardening heat treatments**
B. Pennings, K. Hatanaka, L. Crebolder - *Bosch Transmission Technology B.V., Tilburg, Netherlands*
- 15.00 Alternative heat and surface treatment for drivetrain applications**
V. Strobl, R. Noebauer - *Ruebig GmbH & Co.KG, Wels, Austria*
- 15.20 In-service and simulated thermal transformation of steels for high temperature applications**
P. Auerkari, S. Yli-Olli, S. Tuurna - *VTT, Espoo, Finland*
- 15.40 Development of novel plasma surface engineering technologies for multi-functional surfaces**
K. Lin, L. Tian, X. Li, H. Dong - *The University of Birmingham, United Kingdom*
- 16.00** coffee break

NON FERROUS PROCESSES AND PROPERTIES

Chairperson: **Lorella Ceschini** - *Università di Bologna*

- 16.20 Design optimization of heat treatment support frames for aluminum alloy structural cast parts using virtual experimentation**
H-J. Gaspers, J. Thorborg - *MAGMA Gießereitechnologie GmbH, Aachen, Germany*
- 16.40 Heat treatment optimization of secondary AlSi10MnMg(Fe) test parts fabricated by vacuum assisted high pressure die casting technology**
A.I. Fernández-Calvo, A. Bakedano, E. Barbarias, F. Santos, A. Niklas - *IK4-AZTERLAN, Durango, Spain*
- 17.00 Effect of different pretreatment processes on the properties of copper plating on titanium alloy tubing surface**
Q. Liu, S-y. Song, G. Wu - *China National Petroleum Corporation, Xi'an, China*
Y-n. Chen - *Chang'an University, Xi'an, China*

ROOM A

- 17.40 Keynote lecture**
Consistency in different grain size measurement methods
G.F. Vander Voort - *Struers Inc., Wadsworth, USA*

18.15 END of the second day

19.00 Social event sponsored by





Friday, 22 May 2015

ROOM A

NITRIDING AND NITROCARBURIZING – APPLICATION AND COMBINED PROCESSES

Chairperson: **Emilio Ramous** - *Università di Padova*

9.00 Gaseous nitriding of micro-alloyed steel sheets

E. Leunis, L. Moli Sanchez - *ArcelorMittal Global R&D Gent, OCAS NV, Zelzate, Belgium*

9.20 Fluidized bed nitriding in chemically active powders of HS 6-5-2 steel

K. Lankiewicz, A. Ciski, T. Babul - *Institute of Precision Mechanics, Warsaw, Poland*
J. Nižňanská - *COMTEST FHT a.s., Dobřany, Czech Republic*

9.40 Numerical model of the ferritic nitrocarburizing of plain carbon steels

M. Manivannan, V. Stoilov, D.O. Northwood - *University of Windsor, Canada*

10.00 Acceleration of nitriding process by usage of catalytic properties of oxide films

L. Petrova, V. Aleksandrov, A. Malakhov - *Moscow Automobile and Road Construction State Technical University (MADI), Russia*

10.20 coffee break

COATINGS PROCESSES AND APPLICATIONS

Chairperson: **Silvia Roggero** - *Trattamenti Termici Ferioli & Gianotti*

10.50 Electron beam liquid phase surface treatments – facilitating the use of PVD hard coatings as surface protection for cast irons

A. Buchwalder, A. Jung - *TU Bergakademie Freiberg, Germany*
R. Zenker - *TU Bergakademie Freiberg, Germany and Zenker-Consult, Germany*
M. Steudtner, M. Engelmann - *Techno-Coat Oberflächentechnik GmbH, Germany*
F. Gleißner, R. Schwab - *Schönheider Guss GmbH, Germany*

11.10 Laser surface texturing of PVD coatings applied to sheet forming dies for stainless steel

M. Calandri, D. Ugues - *Politecnico di Torino, Italy*
M. Lorusso - *IIT, Torino, Italy*
A.G. Demir, N.F. Lecis, B. Previtali - *Politecnico di Milano, Italy*

11.30 DEBACOAT project: Development of high-performance extrusion barrels with innovative gradient coatings

J.N. Lemke, L. Rovatti, N. Lecis, S. Zarini, B. Previtali, M. Vedani - *Politecnico di Milano, Italy*
O. Stejskal - *Bernex Bimetallic Sro, Modrice, Czech Republic*
F. Kubisch, M. Pfenning, F. Brueckner, S. Nowotny - *Fraunhofer Institute Material and Beam Technology IWS, Dresden, Germany*
J. Leunda, C. Soriano, C. Sanz - *IK4 – TEKNIKER Polo tecnológico de Eibar, Gipuzkoa, Spain*
B. Bouaifi, D. Schbieb - *nt - Neue Technologie Systemlösungen GmbH, Osterode am Harz, Germany*
C. Andrianopoli - *Cogne Acciai Speciali, Italy*
X. Garmendia - *GNC Láser, Gipuzkoa, Spain*

11.50 Characterization of TiAlBN/TiAlN/TiN multilayer coatings prepared by pulsed d.c plasma-enhanced chemical vapor deposition

K. Kawata, Y. Sekiya, T. Kidachi - *Oriental Engineering Co., Ltd., Kawagoe-city, Japan*

12.30 Closing Ceremony and announcement of the Tom Bell Young Author Award winner, sponsored by Linde Group.

12.50 Announcement of the 23th IFHTSE Congress and of the European Conference on Heat Treatment 2016

13.05 End of the Conference



Friday, 22 May 2015

ROOM B

COATINGS PROPERTIES AND CHARACTERIZATION

Chairperson: **Daniele Ugues** - *Politecnico di Torino*

- 9.00 Electron beam hardening of PVD-coated steels - improved load-supporting capacity for Ti_{1-x}Al_xN layers**
G. Grumbt, H. Biermann - *TU Bergakademie Freiberg, Germany*
R. Zenker - *TU Bergakademie Freiberg, Germany and Zenker-Consult, Mittweida, Germany*
K. Weigel, K. Bewilogua, G. Bräuer - *Fraunhofer IST, Braunschweig, Germany*
- 9.20 Effect of electron beam remelting to microstructure and phase modification of HVOF and CGDS CoNiCrAlY coatings**
P. Gavendová, I. Dlouhý, J. Čížek, J. Čupera, P. Hanusová - *Brno University of Technology, Czech Republic*
- 9.40 The effect of AlN/Ti interlayers on the mechanical and tribological behaviour of DLC coatings**
M. Patru, D. Cristea, I. Ghiuta, D. Munteanu - *Transilvania University of Brasov, Romania*
- 10.00 Tribological behaviours of wear-resistant coatings on 304 stainless steel fabricated by cathodic plasma electrolytic oxidation at ambient and high temperature**
X. Jin, W. Xue, J. Wu, R. Liu, B. Wang, J. Du, X. Wu - *Beijing Normal University, China*
- 10.20** coffee break

INDUSTRIAL HEAT TREATMENT PROCESS AND SIMULATION

Chairperson: **Vincenzo Tosetto** - *Inductotherm Group Italy*

- 10.50 Numerical FEM simulation of induction hardening process: a multiphysical approach**
M. Spezzapria, M. Forzan, F. Dughiero - *Università di Padova, Italy*
- 11.10 Process optimization for an energy efficient heat treatment of ADI**
E. Hepp, M. Dzusov, W. Schäfer - *MAGMA Gießereitechnologie GmbH, Aachen, Germany*
- 11.30 Heat treatment of steels – virtual optimization of microstructures, mechanical properties, stresses and distortions**
C. Thomser, J. Thorborg - *MAGMA Gießereitechnologie GmbH Aachen, Germany*
- 11.50 FE Simulation and temperature measurements for the induction heating of large billets**
M. Magritzer, V. Wieser, P. Markiewicz, S. Zinner - *Böhler Edelstahl GmbH & Co KG, Kapfenberg, Austria*
- 12.10 Study on simulation accuracy of quench distortion of tool steel parts**
M. Narazaki, M. Kogawara, A. Shirayori - *Utsunomiya University, Tochigi, Japan*
H. Someya - *Onward Giken, Tochigi, Japan*
S-Y. Kim, S. Kubota - *Yamanaka Eng. Co, Ltd, Chiba, Japan*

ROOM A

- 12.30 Closing Ceremony and announcement of the Tom Bell Young Author Award winner, sponsored by Linde Group.**
- 12.50 Announcement of the 23th IFHTSE Congress and of the European Conference on Heat Treatment 2016**
- 13.05 End of the Conference**



Posters

Batch annealing model for cold rolled coils and its application

C.-J. Fang, L.-W. Wu - *China Steel Corporation, Kaohsiung, Taiwan R.O.C*

Cutting tool performance of recycle-type Fe3Al composites evaluated by lath

T. Itoi, T. Sudo - *Chiba University, Japan*

Surface preparation and PVD coating of broaches

S. Roggero, D. Franchi - *Trattamenti Termici Ferioli & Gianotti, Caselette, Italy*

C. Galamand - *Platit S.A., Grenchen, Switzerland*

F. Gianotti - *Trattamenti Termici Ferioli & Gianotti, Cascine Vica, Italy*

P. Matteis - *Politecnico di Torino, Italy*

Investigation of friction and wear behaviors of solid expandable casing with different lubricants

S.-y. Song, Q. Liu, F. Tian - *China National Petroleum Corporation, Xi'an, China*

Abrasive impact wear resistance of hardfacings

P. Kulu, A. Surzenkov, R. Tarbe, T. Simson - *Tallinn University of Technology, Estonia*

RQP1: Heat treatment system survey and quality control

P.-F. Cardey - *CETIM, St.Etienne, France*

Effect of solution time during the T6 heat treatment on microstructure and microhardness of a directionally solidified Al-Si-Cu alloy

T.A. Costa, M. Dias, A. Garcia - *University of Campinas, Brazil*

L. Gouvea Gomes, O. Lima Rocha - *Federal Institute of Education, Belém, Brazil*

Valve tests at high pressure and cryogenic conditions

A. Recanati - *SIAD, Bergamo, Italy*

Electrodeposition of minerals substituted hydroxyapatite coating on high energy electron beam treated surgical grade stainless steel for improved mechanical and biological properties

D. Gopi - *Periyar University, Tamilnadu, India*

L. Kavitha - *Central University of Tamilnadu, India*

Metallurgical, mechanical and electrochemical behavior study of the lamellar gray cast iron treated with niobium

M.O. Azzoug, R. Drif, K. Boulgheb, N. Zaourar - *University of Science and Technology Houari Boumediene, Algeria*

N. Madaoui - *Ionized Media Laboratory, Baba Hassene, Algeria*

Gasoxinitriding with variable nitriding potential - material and process specific investigations

A. Dalke, H.-J. Spies, H. Zimdars, H. Biermann - *TU Bergakademie Freiberg IWT, Germany*

Punch lifetime in fine-blanking with optimum combination of mechanical properties

R. Veinthal, P. Peetsalu, M. Saarna, F. Sergejev - *Tallinn University of Technology, Estonia*

Effect of nitriding process on tribological properties of surface engineered steel / aluminum pairs

G. Aktaş, Ş. Polat, Ş. Hakan Atapek - *Kocaeli University, Turkey*

Multi-surface treatments for enhancement of the tribological properties of hot work tool steels used in AA6080 extrusion

G. Aktaş, Ş. Polat, Ş. Hakan Atapek - *Kocaeli University, Turkey*

Pulsed electron beam facilities for surface thermotreatment of materials

V. Engelko - *Efremov Inst. of Electrophysical apparatus, St.Petersburg, Russia*

Behavior of the nitrogen and carbon enriched layer of plasma nitrocarburized 316L austenitic stainless steel on changing pulse frequency and discharge voltage at fixed plasma-off time

A. Barua, I. Lee - *Donggeui University, Busan, Korea*

Effect of pressurized jet on heat transfer characteristics of staggered-array jets on hot steel plate

S. Sohn, T. Kim, K.H. Do, J. Lee - *Korea Institute of Machinery and Materials, Daejeon, Korea*

Influence of processing parameters on geometrical features of clad produced by high power diode laser cladding of carbon steel with different powders

S. Zanzarin, A. Molinari - *Università di Trento, Italy*

S. Bengtsson - *Höganäs AB, Höganäs, Sweden*

Efficiency-enhancing maintenance of heating systems

D. Mäder - *NOXMAT GmbH, Hagen, Germany*

O. Schmiel Gamarra, M. Schulze, R. Lohr - *NOXMAT GmbH, Oederan, Germany*

Numerical method for modelling spray quenching of cylindrical forgings

M. Soltani, A. Pola, G.M. La Vecchia - *Università di Brescia, Italy*

M. Modigell - *GUtech - German University of Technology, Oman*

Effect of different heat treatments on the microstructure and the mechanical properties of a 750 gold alloy

L. Pezzato, G. Magnabosco, K. Brunelli, M. Dabalà - *Università di Padova, Italy*

The influence of chemical composition and microstructure on the heat treatment cycle and mechanical properties of railway wheels

A. Ghidini - *Lucchini RS, Italy*

P. Martelli, C. Viscardi - *Ecotre Valente, Italy*

How to recover oil from washing bath

E. Piana, F. Paradisi - *Karberg & Hennemann, Modena, Italy*

Effect of thickness and substrate material on the functional and mechanical properties of Wc-Co-Cr coatings

E. Gariboldi, N. Lecis - *Politecnico di Milano, Italy*

W. Cerri - *Flame Spray, Milano, Italy*

Gradient Fe-alloy based inlay coatings for extrusion barrels produced by spin casting

J.N. Lemke, L. Rovatti, N. Lecis, M. Vedani - *Politecnico di Milano, Italy*

O. Stejskal - *Bernex Bimetallic Sro, Modrice Czech Republic*

DEBACOAT project: Effect of pre-heating temperature on microstructure and wear resistance of a laser clad Ni-based alloy reinforced with tungsten carbides

L. Rovatti, S. Zarini, R. Casati, B. Previtali, M. Vedani - *Politecnico di Milano, Italy*

DEBACOAT project: Laser cladding of WC reinforced NiCr alloy on inner walls of extrusion barrels

J. Leunda, C. Soriano, C. Sanz - *IK4-TEKNIKER, Gipuzkoa, Spain*

DEBACOAT project: Internal laser cladding of barrels with the newly developed Mini₁₀ cladding head

F. Kubisch, M. Pfennig, F. Brückner, S. Nowotny - *Fraunhofer Institute Material and Beam Technology IWS, Dresden, Germany*



Posters

Technological aspects of the process of steels and cast irons liquid boriding

S.G. Tsikh, V.N. Skorobogatykh - *RPA CNIITMASH, Moscow, Russia*

N.E. Shkliar - *BMSTU, Moscow, Russia*

P.V. Doudkin - *Ltd Termohim, Moscow, Russia*

Gas phase deep nitriding of 32CDV13 low alloy steel for aerospace applications

O. Skiba - *Université de Lorraine, Nancy, France and Hispano-Suiza, groupe Safran, Colombes, France*

J. Dulcy, G. Marcos, T. Czerwicz - *Université de Lorraine, Nancy, France*

A. Courleux, S. Becquerelle - *Hispano-Suiza, groupe Safran, Colombes, France*

Development and optimization of an oxynitrocarburizing treatment

D. Caliani, G. Timelli - *Università di Padova, Vicenza, Italy*

T. Salata, S. Maestri - *Alfa Ossidazione, Borgosatollo, Italy*

Computer simulation of mechanical properties of quenched and tempered stamping punch

B. Smoljan, D. Iljkić, S. Smokvina Hanza - *University of Rijeka, Croatia*

Microstructure and corrosion behavior of duplex coating fabricated by plasma nitriding and TiN/TiCN pulsed DC PACVD method on K390 MC cold work tool steel

D. Landek, F. Cajner, S. Kovačić, V. Alar, V. Macura - *University of Zagreb, Croatia*

Wear resistance of TiN/TiCN and TiN/Ti-B-N multilayers coatings fabricated by the pulsed DC PACVD process on K390 MC cold work tool steel

F. Cajner, D. Landek, H. Rafael, J. Jačan, D. Bogdanić - *University of Zagreb, Croatia*

Liquid Quenchant Database

I. Felde - *Óbuda University, Hungary*

Effect of deep cryogenic treatment on carbides precipitation kinetics during tempering of the X37CrMoV5-1 hot working tool steel

P. Šuchmann, J. Nižňanská - *Comtes FHT, Dobruška, Czech Republic*

Hardening of 100CrMnSi6-4 bearing steel after accelerated carbide spheroidisation and long-duration annealing

D. Hauserova, J. Dlouhy, Z. Novy - *Comtes FHT, Dobruška, Czech Republic*

Bioquenchant based on chemically modified vegetable oil: physical properties and metallurgical behavior

R.L. Simencio Otero, L.C.F. Canale - *Universidade de São Paulo, São Carlos, Brazil*

G.E. Totten - *G.E. Totten & Associates, Seattle, USA*

Influence of pack boriding on the wear and corrosion resistance of AISI H13 steel

S. Cristaldo, L.C. Casteletti - *University of São Paulo, Brazil*

A. Lombardi Neto - *UTFPR-LD, Londrina, Brazil*

C.A. Picon - *EEIS-UNESP, Brazil*

G.E. Totten - *Portland State University, USA*

Boroaustempering thermochemical treatment in nodular cast irons

F. Edson Mariani, L.C. Casteletti - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *Universidade Tecnológica Federal do Paraná, Brazil*

A. Itman Filho - *Instituto Federal do Espírito Santo, Brazil*

G.E. Totten - *Portland State University, USA*

Corrosion resistance of pack chromized Fe-Mn-Al-Si-C steel

L.C. Casteletti, G.S. Takeya - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *UTFPR-LD, Londrina, Brazil*

C.A. Picon - *EEIS-UNESP, Ilha Solteira, Brazil*

G.E. Totten - *Portland State University, USA*

Austempering and boroaustempering treatments in gray cast iron

G. Bortoluci de Assis, F. Edson Mariani, L.C. Casteletti - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *Universidade Tecnológica Federal do Paraná, Brazil*

G.E. Totten - *Portland State University, USA*

Corrosion resistance of pack aluminized Ti-6Al-4V alloy

L.C. Casteletti, G.S. Takeya, G.C. Rego - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *Universidade Tecnológica Federal do Paraná, Brazil*

C.A. Picon - *Universidade Estadual Paulista, Brazil*

G.E. Totten - *Portland State University, USA*

Influence of the boronizing treatment on Fe-Mn-Al-Si-C steel

L.C. Casteletti, G.S. Takeya - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *UTFPR-LD, Londrina, Brazil*

C.A. Picon - *EEIS-UNESP, Ilha Solteira, Brazil*

G.E. Totten - *Portland State University, USA*

Influence of the boronizing on a precipitation hardened niobium stainless steel

L.C. Casteletti, G.S. Takeya, F. Edson Mariani - *Universidade de São Paulo, Brazil*

A. Lombardi Neto - *Universidade Tecnológica Federal do Paraná, Brazil*

G.E. Totten - *Portland State University, USA*

Towards novel long-lasting S-phase based anti-bacterial coatings

D. Formosa, X. Li, H. Dong - *University of Birmingham, United Kingdom*

Effect of aluminizing on surface microstructure of an austenitic stainless steel

B. Matijević, V. Alar, I. Kumić - *University of Zagreb, Croatia*

Spectroscopic ellipsometry investigation of pure, and Al-doped ZnO thin films deposited by radio frequency magnetron sputtering

Y. Li, Z. Chen, S. Li, G. Chang, X. Zhao, K. Xu - *Xi'an University, China*

**POSTERS WILL BE DISPLAYED
FOR THE ENTIRE PERIOD OF THE CONFERENCE**

POSSIBLE CHANGES TO THE PROGRAMME WILL BE COMMUNICATED
DURING THE CONFERENCE.



General Information

Conference Venue

The Conference will be held in Venice Mestre mainland, at NH VENEZIA CONGRESS CENTER - Laguna Palace (Viale Ancona 2, Venezia Mestre, Venice - Italy).

Language

The official language of the Conference will be English. A service of **simultaneous translation (English-Italian)** will be provided.

Proceedings

The full text of the accepted papers will be published in the CD-Rom proceedings and issued to attendees at registration at the Conference site.

Conference schedule

May 19, 2015: Pre-registration

May 20, 2015: Opening session and opening of the exhibition

May 21, 2015: Sessions - social event

May 22, 2015: Sessions

Registration information

REGISTRATION FEES

All registration fees are revenue stamp included

NON members fee

Regular participant:	830 €
Speaker/ Session chairperson:	690 €
Student*:	350 €

AIM member fees

Regular participant:	700 €
Speaker/ Session chairperson:	560 €
AIM junior members:	free
Accompanying persons: (includes only social events)	122 € (VAT included)

Conference Registration fees include admittance to technical sessions, Conference bag with CD-Rom proceedings, coffee breaks, lunches and the social events. For non-members the fee includes AIM Membership for the last three quarters of 2015 and for the year 2016.

* **Students** will have to provide valid proof of student status. In the Student fee, the social events are not included.

Payment and remittance

- by bank transfer, to the order of Associazione Italiana di Metallurgia - AIM at "Banca Popolare Commercio e Industria (UBI Banca)", Branch no. 2 - Via Borgogna, 2/4 - 20122 Milano- Italy, account no. 000000022325 - cod. ABI 05048 - CAB 01602 - cin L, IBAN: IT92L0504801602000000022325, swift code BLOPIT22. The transfer order must specify the name of the delegate and the reference "IFHT-SE 2015". A copy of the transfer order must be sent to AIM, together with the Registration Form.
- by credit card online (www.aimnet.it/ht2015.htm);
- by credit card (Visa, Carta Si, Mastercard, American Express and Diners) and by cash at the registration desk in Mestre (**not for speakers**).



General Information

■ Cancellation and refund policy

A refund, **less 20%** deduction for administrative costs, will be issued for written cancellations received **by May 4, 2015**. For attendees who notify their cancellation **after May 4, 2015** 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 an official invitation please send your request to the Organising Secretariat **before April 30, 2015** 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

The Conference will feature an exhibition that will represent many areas of industry with latest equipment, facilities and instruments, products and services in the field of heat treatment and surface engineering.

The exhibitor will offer a unique opportunity to promote new products, outline services and highlight key achievements to a highly targeted audience.

The exhibition will run from 20 to 22 May.

Interested Companies are kindly requested to contact the Conference secretariat (e-mail: marketing@aimnet.it / fax: +39 0276020551).

■ Social programme

In order to give delegates the opportunity to meet informally and enjoy Venice's atmosphere, AIM organized a Social Event in the evening of May 21, 2015. The Social Event will consist of a boat excursion to Venice Island with a refreshment served at Café Florian in Saint Mark's Square (piazza San Marco).

Announcement of the winner of the Poster Award, sponsored by Linde Group.

The Social Event is sponsored by



■ Mobile/cell phone

Mobiles must be kept turned off or in silent mode in all Congress rooms.

■ Venice

Mestre is on the six boroughs of the city of Venice and it is the mainland gateway to Venice island. Venice, "La Serenissima", holds a mystical aura and is one of the most enchanting places in the world. Built on 117 small islands in a lagoon, Venice is a unique blend of water, art and romance with exquisite canals, charming bridges, magnificent palaces and churches, and world famous landmarks rising from the water's surface up to sky. Whether skimming over a cozy canal on a gondola or strolling around its "calle", visiting Venice is a magical experience for everyone. It is a treasure from the artistic and architectural point of view.

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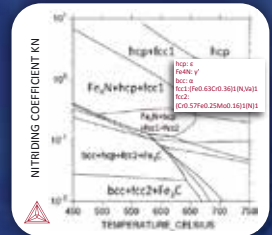
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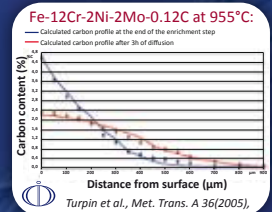
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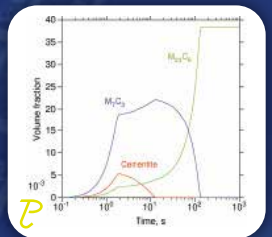
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Lehrer diagram for steel composition:
Fe-Cr-Mo-Mn-Si-C-N



Simulation of carbon evolution
in high alloyed steels

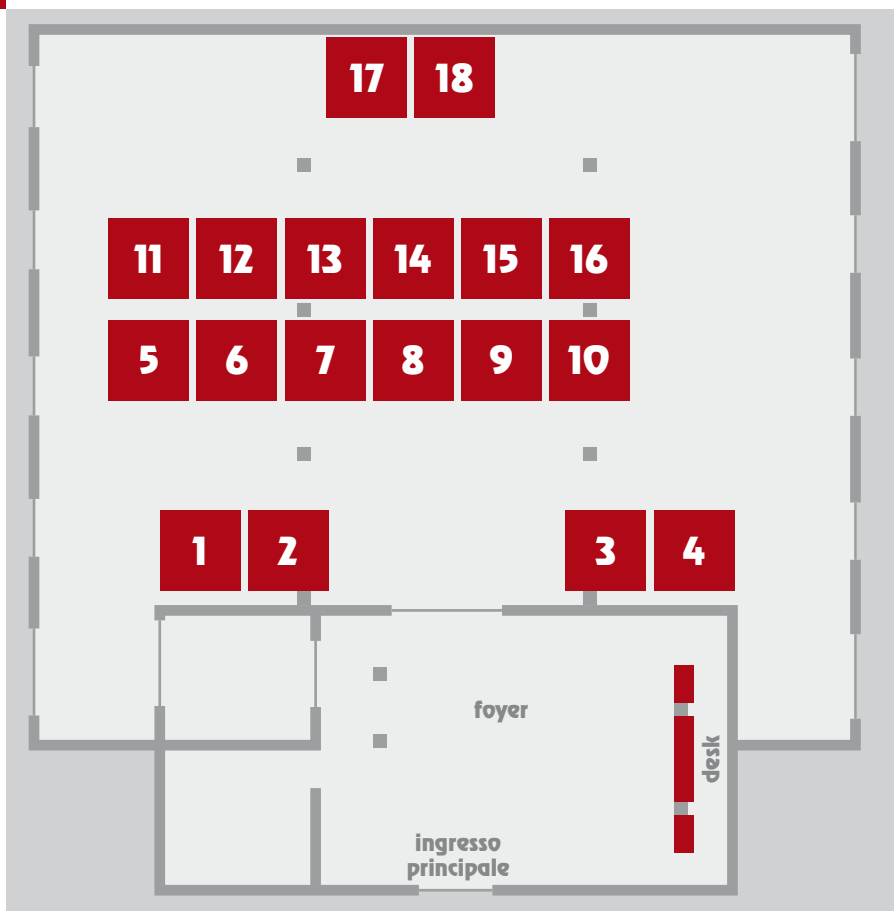


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- Molten salt baths.



STAND 11

www.sajjancastingslimited.com

Heat Treatment Baskets for furnace, Furnace Hearth Roller, Radiant Tubes, Cast Belt Conveyor.



STAND 13

www.sytherms.de

Furnace manufacturer, consulting, service.

- Vacuum furnace with cylindrical heating chamber Type VWC
- Vacuum furnace with cubic heating chamber Type VWQ
- Vacuum bottom loader furnace Type VWS
- Vacuum tempering furnace Type VAD
- Vacuum double chamber furnace Type VWKK



STAND 6

www.struers.com

Struers develops, manufactures and sells materialographic preparation solutions.



Exhibition Catalogue



STAND 12

www.tav-vacuumfurnaces.com

Vacuum furnaces for sintering, brazing, heat treatment, UHV; advanced ceramics; aluminizing and diffusion bonding.



STAND 8

www.tav-engineering.com

Since 1999 TAVEngineering is fully dedicated to provide technical assistance and spare parts for the maintenance, renewal and repair of vacuum furnaces of any type and brand. Routine maintenances and emergency services are performed on site in the shortest possible time. TAVEngineering is a solid and reliable partner which can count on a motivated and highly qualified staff of engineers and technicians.



STAND 9

www.thermocalc.com

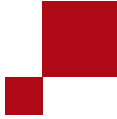
Thermo-Calc Software is a developer of software for calculations involving computational thermodynamics and diffusion controlled transformations in complex alloys. Applications to heat treatment include predicting furnace gas chemistry, formation and growth/dissolution of precipitate phases, multicomponent phase diagrams, kinetics of carburization, nitriding, homogenization and more.



STAND 15

www.wpx-faserkeramik.de

Thermal shock proof components for the industrial heat treatment of metals, made of oxide ceramic matrix composite (OCMC) WHIPOX®



Note

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Note

A series of horizontal dotted lines for writing notes.

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**ASSOCIAZIONE ITALIANA
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p.le Rodolfo Morandi 2
20121 Milano - Italy
phone: +39 0276021132
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fax: +39 0276020551
e-mail: aim@aimnet.it
conference website:
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