

# I N D E X

## PLENARY SESSION

**The international scenario for gas production and large transmission lines**

D. Brkic

**Materials technology for advanced coal power plants**

R. Viswanathan, R. Purgert, U. Rao

**The use of advanced high strength steel sheets in the automotive industry**

C. Federici, S. Maggi, S. Rigoni

**The use of very high strength steels in metallic construction**

G. Sedlacek, C. Müller

**The European Steel Technology Platform - *ESTEP***

J.C. Charbonnier, G. Buzzichelli

## AUTOMOTIVE

### STATE OF THE ART AND FUTURE TRENDS

**Dual phase steels for auto body: design, forming and welding aspects**

B. Carlsson, J. Larsson, T. Nilsson

**Mechanical and technological properties of ultra high strength optim steels**

H. Hemmilä, R. Laitinen, T. Liimatainen, D. Porter

**Hot rolled high strength carbide-free 0.3%C bainitic steels with improved toughness**

S. Allain, A. Couturier, T. Iung, F.G. Caballero, M.J. Santofimia, C. Capdevila,  
C. García de Andrés

**Determination of input data for numerical design of sheet steels.**

**A common research project of the steel and automotive industries**

G. Steinbeck, W. Bleck, C.-P. Bork, T. Evertz, A. Frehn, R. Masendorf, C.M. Sonsino

**A super-high strength Fe-Mn-C austenitic steel with excellent formability  
for automobile applications**

P. Cugy, A. Hildenbrand, M. Bouzekri, D. Cornette, S. Göklü, H. Hofmann

**High strength and ultra high strength hot rolled steel grades - products  
for advanced applications**

H. Spindler, M. Klein, R. Rauch, A. Pichler, P. Stiaszny

**Metallurgically based development of dual-phase thin hot strips  
by Arvedi I.S.P. Technology**

G. Porcu, M.C. Cesile, A. Guindani

# **FORMING - JOINING & MECHANICAL CHARACTERISATION**

## **Keynote: Potential applications of new HSS grades for wheels**

A. Finzi, F. Valente

## **Prediction of forming limit of high-strength steel sheets**

H. Takuda, H. Fujimoto, T. Hama, T. Maruyama

## **Controlling galling in sheet metal forming of high strength steels: a numerical approach**

E. Gelinck, E. van der Heide, M. de Rooij, D. Schipper

## **A comparison of yield loci measured with mechanical tests and calculated from crystal plasticity for steel sheets**

Y.G. An, E. Atzema, M. Workel, H. Vegter, L. Elliott, J. Moerman

## **Possibilities offered by MIG and TIG brazing of Galvanized ultra high strength steels for automotive applications**

C. Chovet, S. Guiheux

## **Effect of YAG laser cutting on stretch-flangeability of 0.1-0.6%C trip sheet steels**

A. Nagasaka, A. Koyama, K. Sugimoto, T. Hojo T. Kashima

## **The application of high-alloyed steel in vehicle structures welding solutions**

H. Herold, J. Pieschel, S. Jüttner

## **FEM evaluation of springback after sheet metal forming: application to high strength of a combined isotropic-kinematic hardening model**

F. Campana, L. Cortese, F. Placidi

## **Determination of fatigue crack propagation limit curves for high strength steels**

J. Lukács

## **Techniques for improving the weldability of trip steel using resistance spot welding**

G. Shi, S.A. Westgate

## **Crystallographic texture and mechanical properties in high martensitic dual phase steels**

S. Barella, R. Venturini, C. Mapelli

## **Local laser heat treatment of ultra high strength steels to improve formability**

A. Weisheit, G. Vitr, K. Wissenbach, S. Scheffler

## **Resistance spot welding of advanced high strength steel DP600**

S. Poggio, M. Ponte, C. Gambaro, J. Adamowski

## **Development of ductile martensitic tubes and its application in automotive parts**

P. Shanmugam, K. Srinivas, M. Preethi, R. Natarajan

## **Potential application of stainless steel for vehicle crashworthiness structures**

F. Placidi, S. Fraschetti

# **HIGH TEMPERATURE MATERIALS**

## **PHYSICAL AND CREEP PROPERTIES**

**Keynote: Microstructural stability of strong 9-12 wt% Cr steels**

H.K.D.H. Bhadeshia

**Change in the system free energy of high Cr heat resistant steels with annealing at elevated temperatures**

Y. Murata, T. Kunieda, M. Nakai, M. Morinaga, T. Koyama

**Structural stability of new creep-resisting steel grades with 9 or 12% Cr contents applied in power generation sector in industrial condition**

J. Pasternak, A. Kielbus

**Creep resistant 9-12% Cr steels - long-term testing, microstructure stability and development potentials**

J. Hald

**New creep rupture assessment of Grade 91**

L. Cipolla, J. Gabrel

**Improvement in creep strength of advanced heat resistant steel based ferrite matrix**

Y. Toda, H. Kushima, K. Kimura, F. Abe

**Microstructural stability and creep data assessment of Tenaris Grades 91 and 911**

A. Di Gianfrancesco, L. Cipolla, F. Cirilli, G. Cumino, S. Caminada

## **BOILERS**

**Keynote: High performance creep resistant steels for 21<sup>st</sup> century power plants**

F. Abe

**Heat resisting steels of the new generation and examples of their application in supercritical boilers designed for the Polish power plants**

J. Brózda, J. Pasternak

**P23 and P24 for power generation and hydrogen service - are they fit for these applications?**

H. van Wortel

**Development of creep resistant 9Cr-3W-3Co steel containing high boron for USC boilers**

H. Semba, F. Abe

## **STEAM TURBINE**

**Keynote: Materials development for boilers and steam turbines operating at 700 °C**

R. Blum, R.W. Vanstone

**Manufacturing and mechanical & metallurgical properties of 9 ~ 12% Cr rotor forgings steel for advanced steam turbine**

S-T. Kang, D-S. Kim, K-C. Kim, M-S. Kim, S-H. Ryu, J-T. Kim

**Cyclic fatigue characteristics of 10%Cr blade steels for advanced steam turbine**  
J-I. Suk, K-C. Kim, B-H. Kim, J-T. Kim

## **OXIDATION AND OPERATIONS**

**Investigations on oxidation and corrosion characteristics of the advanced boiler materials at steam temperatures up to 720°C**  
Q. Chen, G. Stamatelopoulos, A. Helmrich, S. Kjaer, C. Stolzenberger

**The effects of extended operation parameters on X20CrMoV12.1 steel grade structural stability**  
A. Kielbus, K. Rodak, J. Pasternak

**Analysis of effect of chemical composition on hot forming operations of P91 steel**  
S. Spigarelli, E. Evangelista, M. El Mehtedi, L. Balloni, A. Poli

## **WELDMENT**

**Keynote: Alloy design for similar and dissimilar welding and their behaviours**  
C. Jochum, H. Heuser

**Fabrication and weldability of grade 23 tubing and piping**  
A. Poli, S. Caminada, C. Rosellini, A. Bertoni, G. Liberati

**Carbon and nitrogen redistribution in weld joints of heat resistant steels**  
J. Sopoušek, R. Foret

**Low cycle fatigue behaviours of the welded joints of 9 to 12% Cr ferritic heat resistant steels for boiler of fossil power plants**  
S-H. Ryu, Y-S. Lee, B-O. Kong, J-T. Kim, D-H. Kwak, S-W. Nam

## **MISCELLANEOUS**

**New heat resistant alloys more over 700°C**  
S. Muneki, H. Okubo, F. Abe

**Reliability of computer simulations for the design of a cost effective low Ni heat resistant austenitic steel**  
O. Tassa, H. van Wortel, B. Bonnefois, E. Baune

**Copper in super304H heat resistant steel**  
S.C. Cheng, Z.D. Liu, G. Yang, Y. Yang, L.M. Wang, X.J. Sun, H. Dong

**Crack growth behaviour of P92 at temperatures above 500°C in different atmospheres**  
F. Schubert

# STRUCTURAL APPLICATIONS

## STRUCTURAL STEEL

### **Keynote: Light-weight design chances using high-strength steels**

C.M. Sonsino

### **Structural applications of stainless steel**

G. Abbruzzese, M. Barteri

### **Production and properties of high-strength nickel-alloy steel plates for low temperature applications**

K. Hickmann, A. Kern, U. Schrieffer, J. Stumpfe

### **Consumables for welding of (very) high strength steels - mechanical properties of weldments in as-welded and stress-relieved applications**

E. Bauné, C. Chovet, B. Leduey, C. Bonnet, S. Starck, A. Bertoni

## OCTG & DIVERSIFIED

### **Development of high strength quenched and tempered seamless pipes**

A. Di Schino, E. Anelli, G. Cumino, M. Tivelli, A. Izquierdo

### **The design of X80 to X120 steels with increased carbonic acid corrosion resistance**

D.V. Edmonds, R.C. Cochrane, R.M. Grau, J.P. Gonzalez, B. Kermani

### **Design criteria vs line pipe requirements for offshore pipelines**

E. Torselletti, L. Vitali, R. Bruschi

## PIPELINE

### **Keynote: The TAP Project**

F. Marchesani, E. Donati, C.M. Spinelli, G. Mannucci, G. Demofonti, M. Cabrini, T. Pastore

### **Development, production and application of heavy plates in grades up to X120**

F. Grimpe, S. Meimeth, C.J. Heckmann, A. Liessem, A. Gehrke

### **Effect of simulated thermomechanical processing on the transformation characteristics and microstructure of an API X80 pipeline steel**

P. Cizek, B.P. Wynne, P.D. Hodgson, B.C. Muddle

### **Technological solutions for ultra-high strength gas pipelines**

H.G. Hillenbrand, C. Kalwa, A. Liessem

### **Fracture resistance against internal pressure on high strength over X80 line pipe**

N. Takahashi, A. Yamamoto, M. Miura, H. Makino, M. Hamada, I. Takeuchi

### **Strain based design for land high grade pipelines in harsh environments**

L. Vitali, E. Torselletti, F. Marchesani, R. Bruschi

### **Development of high strength linepipes with excellent deformability**

M. Okatsu, N. Ishikawa, S. Endo, N. Suzuki

### **X100 - Fracture initiation and propagation**

G. Mannucci, G. Demofonti, M. Di Biagio

### **X100 - Girth welding, joint properties and defect tolerance**

M. Hudson, L. Di Vito, G. Demofonti, R. Aristotile, B. Andrews, S. Slater

### **Development of API X-80 grade electric resistance welding line pipe with excellent low temperature toughness**

H. Nakata, C. Kami, O. Shiotani, M. Matsushita, S. Kawamura

### **Development of new in-mill mechanical testing towards X100 assessment for gas pipe**

G. Perrin, M. Martinez, P. Odru, T.T. Luu, A. Pineau, B. Tanguy, J. Besson

## **CONSTRUCTION**

### **Keynote: HS steels in tension structures**

M. Majowiecki

### **Keynote: High strength steels for launching bridges structures**

E. Maiorana, A. Miazon

### **The development of ultrahigh strength wire**

S. Hobson, J. Wilkinson, C. O'Connor, S. Sefton

### **High-strength steels in welded state for light-weight constructions under high and variable stress peaks**

H. Kaufmann, C.M. Sonsino, G. Demofonti, S. Riscifuli

### **Eurocode for high strength steel and applications in construction**

B. Johansson, P. Collin

### **Recent developments in the use of quenched and self-tempered hot rolled h-beams**

L. Weber, L-G. Cajot

### **Properties of high strength steel S890 in dry and aqueous environments**

N. Enzinger, H. Cerjak, Th. Böllinghaus, Th. Dorsch, K. Saarinen, E. Roos

## **PHYSICAL METALLURGY & ALLOY DESIGN**

### **GRAIN REFINEMENT**

### **Keynote: Ultra-steels: innovation of steel structures by materials evolution**

K. Nagai

### **Keynote: Research activities on advanced steels in NERCAST**

H. Dong, Y. Gan, Y. Weng

### **Keynote: Development of high strength and high performance steels at POSCO through HIPERS-21 Project**

J-K. Choi

### **Keynote: Ultrafine grained steels by advanced thermomechanical processes and severe plastic deformations**

I. Salvatori

### **Fabrication and tensile properties of ultrafine grained steels**

D.H. Shin, W.G. Kim, J.Y. Ahn, K.-T. Park, N.J. Kim

**The formation of ultrafine grained microstructure in a plain C-Mn steel**

R. Song, D. Ponge, D. Raabe

**Change of effective thickness of austenite grain during severe plastic deformation**

D-W. Suh, C-S. Oh, S-J. Kim

**Deformation induced ferrite transformation and grain refinement in low carbon steel**

X. Sun, Q. Liu, H. Dong

**Effect of shear strain on deformed microstructures of austenitic grains**

T. Inoue, F. Yin, K. Nagai

**Grain refinement and high precipitation hardening by combining microalloying and ultra fast cooling**

C. Mesplont

**Mechanical properties of an ultrafine grained C-Mn steel**

R. Song, D. Ponge, D. Raabe

**High strength and good ductility of bulk nanostructured meta-stable austenitic alloys**

J-E. Jin, Y-K. Lee - Yonsei University, Seoul, Korea

**Fracture toughness of the welded joint of new generation ultra-fine weathering steel**

H. Qiu, T. Nishimura, K. Hiraoka

**Improvement of hydrogen embrittlement in a tempered martensitic steel through grain refinement using undissolved cementite**

Y. Kimura, K. Tsuzaki

## **STRUCTURE & PROPERTIES**

**Keynote: Innovation of conventional heat treatment and microstructural modification of steel by electromagnetic processing**

Y. Zhang, X. Zhao, L. Zuo, C. Esling

**Microstructure and strain distribution influence on failure properties in formable steel sheets**

P. Olaru, G. Gottstein, A. Pineau

**Optimizing the mechanical properties of tempered martensitic steels**

A. Ardehali Barani, D. Ponge

**Effect of vanadium and thermomechanical treatment on the properties of 55SiCr6**

A. Ardehali Barani, L. Fei, P. Romano, D. Ponge

**Effect of intergranular ferrite on hydrogen delayed fracture resistance of high strength boron-added steel**

J.S. Kim, C.S. Lee, K-T. Park, D. Lee

**Solidification structure and properties of Nb-V microalloyed steels**

G. Cumino, A. Mannucci, M. Vedani, J.C. Gonzalez

**The influence of austenite on the toughness of martensitic steels**

J.W. Morris Jr.

**Improvement of mechanical properties in Fe-Mn-Ti steel by alloying with Cr and Mo**

M. Nili-Ahmadabadi, M. Sadeghi, H. Shirazi, S. Hossein Nedjad

**High strength, toughness and nanostructure considerations for Fe/Cr/Mn/C lath martensitic steels**

G. Kusinski, G. Thomas

**Influence of tempering temperature on mechanical properties of ultra-high strength low-alloy steels**

J. Horníková, P. Šandera, J. Pokluda

**Fractal nature of acicular ferrite, and fine precipitation in medium carbon micro-alloyed forging steels**

R. Villegas, A. Redjaimia, M. Confente, M.T. Perrot-Simonetta

**Fundamental study of the austenite formation and decomposition in high strength low-Si, Al added Nb-Mo trip steels**

J.E. Garcia-Gonzalez, C.I. Garcia, M. Hua, A.J. De Ardo

## **ALLOY DESIGN**

**Microstructural features of a new martensitic steel heat treatment: quenching and partitioning**

D.V. Edmonds, K. He, F.C. Rizzo, A. Clarke, D.K. Matlock, J.G. Speer

**The role of niobium in low carbon bainitic HSLA steel**

K. Hulka

**Quantitative evaluation of the microstructure in an Fe-Cr-C ternary martensitic steel with the aid of the system free energy concept**

T. Kunieda, Y. Murata, M. Morinaga, M. Nakai, T. Koyama

**Effect of Nb in solid solution on the austenite decomposition kinetic of a V-Nb-Ti microalloyed steel**

M. Buhler, G.R. Gomez, T. Pérez

**Acceleration of graphitisation in carbon steels to improve machinability**

D.V. Edmonds, K. He

**Stainless austenitic steel of superior strength**

H. Berns, V. Gavriljuk

**Influence of deformation and molybdenum content on acicular ferrite formation in medium carbon steels**

C. Capdevila, J.P. Ferrer, F.G. Caballero, C. García de Andrés

**The effect of chemical composition on the hot-deformation resistance during hot strip rolling of microalloyed steels processed at the Sidor hot strip mill**

F. Siciliano, O. Marini, R.G. Bruna

**The development of Nb-V microalloyed steel plate**

Y. Feng

**Very strong bainitic steels**

F.G. Caballero, C. García-Mateo, H.K.D.H. Bhadeshia

## **MODELING**

### **Towards economic design of a pressure vessel made of duplex stainless steel**

M. Veljkovic, J. Gozzi

### **Thermodynamic modelling to support production of high nitrogen steels by different processes**

F. Ruffini, O. Tassa, A. Carosi, F. Arcobello, B. Giambi

### **Simulation of diffusional processes during solidification in austenitic steels**

D. Baldissin, L. Battezzati, M.R. Ridolfi, O. Tassa

## **CORROSION AND SURFACE PROTECTION**

### **Coating technology of high strength steels without hydrogen embrittlement**

W. Paatsch, V.-D. Hodoroaba

### **PVD coating of steel strips**

C. Metzner, B. Scheffel, F.-H. Roegner

## **ADVANCED FABRICATION PROCESSES**

### **Production and application of high strength steel**

Y. Feng

### **Direct Strip Casting (DSC) - an option for the production of HSD<sup>®</sup> steel grades**

M. Schäperkötter, H. Eichholz, J. Kroos, M. Niemeyer, R. Schmidt-Jürgensen, K.-H. Spitzer

## **WELDING**

### **Toughness of HRC 33/44 tool steels weldments with yield strength 1100 MPa**

C. Larsson, P. Hansson, P. Kihlmark

### **Influence of chemical composition of weld metal on the properties of welded joint of high strength steels**

Z. Huang, K. Miao, L. Hu

### **Laser beam welding of quenched and tempered ASTM A 517 Gr.B steel**

S. Missori, G. Costanza, E. Tata, A. Sili

### **Comparison of fatigue properties of welded TMCP steel and normalized steel**

K.S. Park, S.J. Cho, C.S. Lee, Y.H. Ahn, J.S. Park, J.B. Lee

### **New alloying concepts for high strength steel weld metals**

E. Keehan, L. Karlsson

### **Local mechanical and microstructural characterization of electron beam welded 15-5PH stainless steel**

E. Herny, J.M. Cloue, S. Perusin, E. Andrieu, P. Lours, E. Jourdain, P. Lagain