FINAL PROGRAM & SHOW DIRECTORY

23RD IFHTSE CONGRESS

APRIL 18-21, 2016

HYATT REGENCY

SAVANNAH, GEORGIA

Organized by:

IFHTSE
INTERNATIONAL FEDERATION FOR HEAT TREATMENT AND SURFACE ENGINEERING

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GENERAL INFORMATION

ABOUT THE EVENT:

The ASM Heat Treating Society and the International Federation of Heat Treatment and Surface Engineering have partnered to create an exciting event focused on Thermal Processing, Heat Treating and Surface Engineering. This event will bring together international experts from around the globe to present the latest innovations and research in Thermal Processing and Surface Engineering. Thermal Processing is a critical step in bringing goods to market. Historically it has encompassed only heat treating ferrous and non-ferrous alloys. However, with new advances in composites, additive manufacturing, tribology and surface engineering, the science and art of thermal processing has taken on a vital importance to the high performance requirements of performance, cost and quality.

REGISTRATION SCHEDULE

Day/Date	Hours	Location
Monday, April 18, 2016	2:00–6:30 p.m.	Regency Ballroom Foyer, 2nd Floor
Tuesday, April 19, 2016	7:00 a.m.–5:30 p.m.	Regency Ballroom Foyer, 2nd Floor
Wednesday, April 20, 2016	7:00 a.m.–5:30 p.m.	Regency Ballroom Foyer, 2nd Floor
Thursday, April 21, 2016	7:00 a.m.–12:00 p.m.	Regency Ballroom Foyer, 2nd Floor

EXHIBIT DATES AND TIMES

Location: Regency Ballroom A

Monday, April 18
Welcome Reception: 5:30–7:00 p.m.

Tuesday, April 19
Morning Refreshment Break: 10:40–11:00 a.m.
Lunch: 12:00–1:30 p.m.
Afternoon Refreshment Break: 3:10–3:30 p.m.

Wednesday, April 20
Morning Refreshment Break: 10:10–10:30 a.m.
Lunch: 12:30–1:30 p.m.

SESSION CHAIRS

REMINDER: Session Chairs should pick up their packets at the IFHTSE Congress Registration Desk in the Regency Ballroom Foyer.

SPEAKERS

REMINDER: All speakers should plan to meet in the room of your presentation 30 minutes prior to the start of your session in order to upload your presentation. This will allow all speakers the opportunity to meet their session chair and go over any final conference details and any audio visual concerns.

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In consideration of fellow event attendees and presenters, show management kindly requests your cooperation in minimizing disturbances which may occur during technical sessions. We ask that cellular phones or other electronic devices be placed in **"silent mode"** while you are in the meeting rooms. Please step outside the meeting room if you need to have a conversation.

PROCEEDINGS

Each full conference registrant will receive online access to the manuscripts. You should have received an email with a link to the proceedings and instructions on how to access them.

SOCIAL MEDIA

Follow us on Twitter @asminternatnl and share your conference highlights with #ifhtse16.

ORGANIZING COMMITTEE

General Chairman: Dr. D. Scott MacKenzie, FASM, Houghton International Inc.

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Mr. Rob Goldstein, Fluxtrol, Inc.
Dr. Christian Moreau, Concordia University
Dr. George Totten, Totten & Associates
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Dr. Sabine Denis, Henri Poincare University, LSG2M
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Prof. Y.M. Rong
Prof. Bozo Smoljan
Ms. Eva Troell, Swerea
Mr. Ole West
Prof. Hans-Werner Zoch, IWT

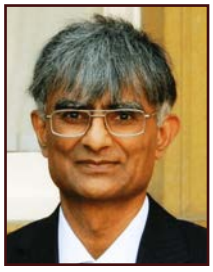
KEYNOTE SPEAKERS

PROF. H. K. D, H. BHADESHIA

Dept of Materials Science and Metallurgy, University of Cambridge

Very Short and Very Long Heat-Treatments in the Processing of Steel

Tuesday, April 19, 2016, 9:00 a.m.



Harry Bhadeshia is the TATA Steel Professor of Metallurgy at the University of Cambridge. His research is concerned with the theory of solid-state transformations in metals, particularly multicomponent steels, with the goal of creating novel alloys and processes with the minimum use of resources. He is the author or coauthor of more than 600 research papers and six books on the subject. He is a Fellow of the Royal Society, Fellow of the Royal Academy of Engineering, the National Academy of Engineering (India) and the American Welding Society.

MR. TOBIAS STEINER

Alloying Element Nitride Development in Ferritic Fe-based Materials upon Nitriding

Tuesday, April 19, 2016, 10:00 a.m.

Tobias Steiner studied materials science at the University of Stuttgart from 2007 to 2012. He made his diploma thesis in 2012 in the department of Prof. Mittemeijer on the topic “Nitriding of Ti and Ti-Al alloys”. Since 2012 he is working on his PhD thesis on the topic “Internal precipitation of nitrides in Iron-based alloys” in the department of Prof. Mittemeijer at the Max Planck Institute for Intelligent Systems. His research is mainly focused on the nitriding behavior of ternary Fe-Cr-Mo alloys and the evolution of the XRD peak shape upon nitriding of ferritic alloys. Beginning from December 2015 he is working as a materials expert for stainless steels at Robert Bosch GmbH in the department GS/ECC-FA. He can be contacted at tobias.steiner2@de.bosch.com

PROF. DR.-ING. HABIL. ROLF ZENKER

Zenker Consult Mittweida

Surface Treatment by Electron Beam in Combination with Other Heat Treatment Technologies

Tuesday, April 19, 2016, 11:00 a.m.

VITA

1965–1972	studies (Technical University (TU) Karl-Marx-Stadt)
1972–1977	Acientific Assistant (TU Karl-Marx-Stadt)
1975	Dr.-Ing. graduation (TU Karl-Marx-Stadt)
1978–1987	Senior Engineer (TU Karl-Marx-Stadt)
1984	Facultas Docendi (Technical University Karl-Marx-Stadt)
1986	postdoctoral lecture qualification (TU Bergakademie Freiberg)
1987–1999	Department Manager in different companies
1999–2002	Managing Director
1990–2002	Associate Professor at different University (Chemnitz, Freiberg, Erlangen, Mittweida)
Since 2003	Honorary Professor at TU Bergakademie Freiberg Managing Director of Zenker-Consult Mittweida

SCHEDULE-AT-A-GLANCE

Date & Time	Event	Location
Monday, April 18, 2016		
8:30 a.m.–6:00 p.m.	HTS Board Meeting (Invited)	Plimsoll Room
9:00 a.m.–12:00 p.m.	IFHTSE Executive Committee Meeting (Invited)	Savannah Room
2:00–6:30 p.m.	Conference Registration Open	Regency Ballroom Foyer
3:30–5:30 p.m.	Exhibitor Set-up	Regency Ballroom A
2:30–3:30 p.m.	Tom Bell Award Judging (Invited)	Westbrook Room
4:00–5:00 p.m.	IFHTSE General Assembly Meeting	Savannah Room
5:30–7:00 p.m.	Welcome Reception with Exhibitors	Regency Ballroom A
7:00–9:00 p.m.	HTS Technology and Programming Committee Meeting (Invited)	Offsite
Tuesday, April 19, 2016		
7:00 a.m.–5:30 p.m.	Registration Open	Regency Ballroom Foyer
7:30–8:30 a.m.	Continental Breakfast	Regency Ballroom Foyer
9:00–10:40 a.m.	Keynote Address I	Regency Ballroom DEF
10:40–11:00 a.m.	Morning Refreshment Break with Exhibitors	Regency Ballroom A
11:00 a.m.–12:00 p.m.	Keynote Address II	Regency Ballroom DEF
Noon–1:30 p.m.	Networking Lunch with Exhibitors	Regency Ballroom A
1:30–3:10 p.m.	Technical Programming	Regency Ballroom DEF
3:10–3:30 p.m.	Afternoon Refreshment Break with Exhibitors	Regency Ballroom A
3:30–5:30 p.m.	Technical Programming	Regency Ballroom BC, DEF
6:30 p.m.	Offsite - Savannah Riverboat Cruise*	See page 7 for details
Wednesday, April 20, 2016		
7:00 a.m.–5:30 p.m.	Registration Open	Regency Ballroom Foyer
7:30–8:30 a.m.	Continental Breakfast	Regency Ballroom Foyer
8:30–10:10 a.m.	Technical Programming	Regency Ballroom B, C, DEF
10:10–10:30 a.m.	Morning Refreshment Break with Exhibitors	Regency Ballroom A
10:30 a.m.–12:30 p.m.	Technical Programming	Regency Ballroom B, C, DEF
10:45 a.m.–1:30 p.m.	Spouse/Guest Program - Savannah Trolley Tour with Lunch*	See page 7 for details
12:30–1:30 p.m.	Networking Lunch with Exhibitors	Regency Ballroom A
1:30–3:10 p.m.	Technical Programming	Regency Ballroom B, C, DEF
1:30–3:30 p.m.	Exhibitor Tear Down	Regency Ballroom A
3:10–3:30 p.m.	Refreshment Break	Regency Ballroom Foyer
3:30–5:30 p.m.	Technical Programming	Regency Ballroom B, C, DEF
6:00–6:30 p.m.	Networking Reception	Harborside Center
6:30–8:30 p.m.	Networking Dinner and The Linde Group Poster Award	Harborside Center
Thursday, April 21, 2016		
7:00 a.m.–12:00 p.m.	Registration Open	Regency Ballroom Foyer
7:30–8:30 a.m.	Continental Breakfast	Regency Ballroom Foyer
8:30 a.m.–10:10 a.m.	Technical Programming	Regency Ballroom B, C, DEF
10:10–10:30 a.m.	Refreshment Break	Regency Ballroom Foyer
10:30 a.m.–12:30 p.m.	Technical Programming	Regency Ballroom B, C, DEF
12:30–1:30 p.m.	Lunch and Closing Session: Residual Stress Panel Discussion	Regency Ballroom A
1:30–1:45 p.m.	Closing Remarks and Awards Presentation: Tom Bell Young Author Award	Regency Ballroom A
2:00 p.m.	Conference Concludes	

**Additional Fee, not included with conference registration*

SPECIAL EVENTS

RESIDUAL STRESS SYMPOSIUM

This special symposium will provide an overview of the current state of the art for residual stress prediction, measurement and control in industry. Presentations will be given by major aerospace OEMs and experts in the field of residual stress modeling and measurement. Please see technical program for specific schedule of sessions.

WELCOME RECEPTION WITH EXHIBITORS

Monday, April 18, 2016, 5:30–7:00 p.m.
Regency Ballroom A
Included with Registration

Relax, meet with exhibitors and enjoy light appetizers and drinks during this year's Welcome Reception. Conference attendees receive two drink tickets. Cash bar thereafter.

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SAVANNAH RIVERBOAT CRUISE

Tuesday, April 19, 2016
Boarding: 6:30 p.m.
Sailing Time: 7:00 p.m.
Return: 9:00 p.m
Tickets: $85.00 each (pre-registration required)

Don't miss this exciting night aboard the Savannah Riverboat Cruise with delicious buffet dinner featuring local cuisine. You can venture onto the top deck and capture an amazing evening view of one of the most famous waterfronts in the USA.

To get to the boat: From the lobby level take the Harborside elevators down one level to river street. Proceed to walk out the glass doors and take a left. Walk about 10 feet and take another left, the boats will be right in front of you.

NETWORKING RECEPTION AND DINNER

Wednesday, April 20, 2016
6:00–8:30 p.m.
Hyatt Regency Savannah
One ticket included with registration.
Additional tickets are $70.00 each
Enjoy a night with friends and colleagues at the IFHTSE 2016 Dinner Reception.

SPOUSE PROGRAM

Wednesday, April 20, 2016
10:45 a.m.–1:30 p.m.
Tickets: $75.00 each (pre-registration required)

View beautiful Downtown Savannah on this 90 minute guided history trolley tour and enjoy lunch at The Lady & Sons. Includes on/off trolley access after tour for the rest of the day. The trolley will pick you up in the front driveway of the Hyatt on W Bay Street.

TECHNICAL PROGRAM

TUESDAY, APRIL 19, 2016

7:30–8:30 a.m.
Continental Breakfast in Regency Ballroom Foyer

Keynote I
8:45–10:40 a.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Scott MacKenzie
Session Chair: Patrick Jacquot

8:45 a.m.
Opening Remarks

9:00 a.m.
Very Short and Very Long Heat-Treatments in the Processing of Steel: Prof. H. K. D, H. Bhadeshia, Dept of Materials Science and Metallurgy, University of Cambridge, Cambridge, United Kingdom

10:00 a.m.
Alloying Element Nitride Development in Derritic Fe-Based Materials Upon Nitriding: Mr. Tobias Steiner and Prof. Eric J. Mittemeijer, Max-Planck Institute for Intelligent Systems (formerly Metals Research), Stuttgart, Germany

10:40–11:00 a.m.
Networking Break with Exhibitors
Meeting Room: Regency Ballroom A

Keynote II
11:00 a.m.–12:00 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Scott MacKenzie
Session Chair: Patrick Jacquot

11:00 a.m.
Surface Treatment by Electron Beam in Combination With Other Heat Treatment Technologies: Prof. Rolf Zenker[1] and Mrs. Gundis Grumbt[2], [1]Zenker Consult, Mittweida, Germany, [2]Institute of Materials Engineering, TU Bergakademie Freiberg, Freiberg, Germany

12:00–1:30 p.m.
Lunch with Exhibitors
Meeting Room: Regency Ballroom A

Nitriding I
1:30–2:30 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Patrick Jacquot
Session Chair: Vojteh Leskovsek

1:30 p.m.
The Effects of Process Parameters on Nitrogen Infiltration tnd the Controlling of Nitrogen Concentration in Vacuum Nitriding: Dr. Masahiro Okumiya[1], Dr. Yoshiki Tsunekawa[1], Dr. Jung-Hyun Kong[1] and Dr. Sang-gweon Kim[2], [1]Toyota Technological Institute, Nagoya, Japan, [2]Heat treatment Group, KITECH, Incheon, South Korea

1:50 p.m.
Gas Phase Deep Nitriding of 33Crmov12-9 Steel: A Microstructural Characterization of the Precipitates: Mr. Olivier Skiba[1,2], Jacky Dulcy[2], Grégory Marcos[2], Alice Courleux[1] and Thierry Czerwiec[2], [1]Hispano-Suiza, Colombes, France, [2]Institut Jean Lamour (UMR 7198) CNRS, Nancy, France

2:10 p.m.
Effect of Plasma Nitriding on Corrosion Behaviour of AISI 4330 Low Alloy Steel: Mr. Vinaykumar Bapuso Patil, R&D, Bharat Forge Limited, Pune, India

3:10–3:30 p.m.
Networking Break with Exhibitors
Meeting Room: Regency Ballroom A

Quenching and Quenchants I
3:30–5:30 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Lynn Ferguson
Session Chair: Thomas Luebben

3:30 p.m.
Press Quench Process Design for a Bevel Gear using Computer Modeling: Dr. Zhichao (Charlie) Li, Mr. Andrew M Freborg and Dr. **B. Lynn Ferguson,** DANTE Solutions, Inc., Cleveland, Ohio

3:50 p.m.
Intensive Quenching of AISI 5160 Spring Steel Using Small Scale Laboratoty Equipment: A Progress Report: Dr. George E. Totten[1], **Mr. Luigi Leonardo Mazzucco Albano2**, João Gilberto Lucio[3], Fernando S. Misina[2], Vojteh Leskovisek[4] and Dr. Lauralice de C. F. Canale[2], [1]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon, [2]Department of Materials Engineering, University of SÃ£o Paulo, SÃ£o Carlos/SP, Brazil, [3]Rassini NHK, SÃ£o Bernardo do Campo, Brazil, [4]University of Ljubljana, Ljubljana, Slovenia

4:10 p.m.
Maximizing Quenching in Vacuum Heat Treating: Mr. Thomas Wingens, WINGENS International Industry Consultancy, Sewickley, Pennsylvania

4:30 p.m.
Online Selection of Quenchant Cooling Heat Exchanger: Mr. Gary Berwick and Mr. Matt Reed, Dry Coolers Inc., Oxford, Michigan

4:50 p.m.
Ionic Liquids for Immersion Quenching of Aluminium Alloys: Mr. Martin Beck[1], Mrs. Christin Neise[1], Dr. Michael Reich[2], Dr. Mathias Ahrenberg[1], Prof. Christoph Schick[2], Prof. Udo Kragl[3] and Prof. Olaf Keßler[4], [1]University of Rostock, Rostock, Germany, [2]Institut für Physik, University of Rostock, Rostock, Germany, [3]Institut für Chemie, University of Rostock, Rostock, Germany, [4]Chair of Materials Science, University of Rostock, Rostock, Germany

5:10 p.m.
Beer, Blood and Urine—Mythological Quenchants of Ancient Blacksmiths: Dr. D. Scott MacKenzie and Gloria Graham, Houghton International, Valley Forge, Pennsylvannia

Reliability and Process Control
3:30–5:30 p.m.
Meeting Room: Regency Ballroom BC

Session Chair: Andrew Freborg
Session Chair: Masahiro Okumiya

3:30 p.m.
Pre-Oxidation Treatment to Increase the Service Life of Heat Treatment Furnace Conveyor Belts Made of AISI 330Cb Industrial Application: Mrs. Cecile Combe[1], Mr. Pierre Francois Cardey[1], Dr. Henri Buscail[2], C. Issartel[2], F. Riffard[2] and R. Rolland[2], [1]Cetim, Saint Etienne, France, [2]Lveem, Le Puy En Velay, France

3:50 p.m.
Fracture Analysis of the Screwed Copper Pipe for Heat Exchanger: Mrs. Wu Chaoqun, Guangzhou Research Institute of Non-ferrous Metals, Guangzhou, China

4:10 p.m.
Effect of Microstructure on the Fatigue Crack Growth Behaviour in Low Carbon Steel: Mr. Daisuke Watanuki[1], Dr. Hangyue Li[2] and Prof. Paul Bowen[2], [1]Basic Technology Research Center, NSK Ltd., Kanagawa, Japan, [2]Metallurgy & Materials, University of Birmingham, Birmingham, United Kingdom

4:30 p.m.
Life Extension of Furnace and Fixture Alloys by Surface Engineering in Carburizing Atmospheres: Mr. Anbo Wang, Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts

4:50 p.m.
Formulae For Safe Design Against Fatigue Failures: Mr. Nori VSN Murthy, Independent Research Scientist, None, India

5:10 p.m.
VNR Method—Maximizing the Signal-to-Noise Ratio at Cryogenic Temperatures of Structure-Critical Fasteners: Mr. Victor Sloan, Victor Aviation Service, Inc, Palo Alto, California

WEDNESDAY, APRIL 20, 2016

7:30–8:30 a.m.
Continental Breakfast in Ballroom Foyer

Advanced Thermal Processing I
8:30–10:10 a.m.
Meeting Room: Regency Ballroom C

Session Chair: Valery Rudnev
Session Chair: Michael Pershing

8:30 a.m.
Design of Advanced Tempering Diagrams of Tool Steels Using Multifunctional CNPTB Specimen: Prof. Bojan Podgornik[1], Mr. Gašper Puš[2], Dr. Vojteh Leskovsek[3] and Dr. Matjaž Godec[1], [1]Materials testing, Institute of Metals and Technology, Ljubljana, Slovenia, [2]University Nova Gorica, Nova Gorica, Slovenia, [3]Heat Treatment and Surface Engineering Department, Institute of Metals and Technology, Ljubljana, Slovenia

8:50 a.m.
Microstructural Evolution in Microalloyed Steels during High-Speed Thermomechanical Bar and Rod Rolling: Prof. Robert Cryderman, Mr. Blake Whitely and Dr. John G. Speer, George S. Ansell Dept. of Metallurgical and Materials Engineering, Colorado School of Mines, Golden, Colorado

9:10 a.m.
Hot Hydroforging of Lightweight Bimaterial Gears and Hollow Products: Dr. Bulent Chavdar[1], Mr. Robert C. Goldstein[2] and Dr. B. Lynn Ferguson[3], [1]Corporate Research and Technology, Eaton, Southfield, Michigan, [2]Fluxtrol Incorporated, Auburn Hills, Michigan, [3]DANTE Solutions, Inc, Cleveland, Ohio

9:30 a.m.
Effect of processing Route on Microstructure and Impact Toughness of Duplex Stainless Steel: Mr. Amit Powar, Mr. Amol Gujar, Mr. Niketan Manthani, Mr. Vinayak Pawar and Dr. Rajkumar P Singh, Kalyani Centre for Technology & Innovation, Bharat Forge Ltd., Pune, India

9:50 a.m.
Effect of Electron Beam Welding on Microstructure and Mechanical Properties of Ti-6Al-4V Alloy : Mr. Sandeep Thakare[1], Dr. N prabhu[2], Mr. Prakash Kattire[3] and Dr. RKP Singh[4], [1]MEMS, Bharat Forge limited, Pune, India, [2]IIT Bombay, mumbai, India, [3]Research and development, KCTI, Bharat forge Ltd. Pune, India, Pune, India, [4]Research and development, Bharat forge ltd., Pune, India

Cryogenic Processing
8:30–9:30 a.m.
Meeting Room: Regency Ballroom B

Session Chair: Rozalia Papp

8:30 a.m.
The Sub-Zero Celsius Treatment of Stainless Steels: Experiments and Perspective: Dr. Matteo Villa, Dr. Thomas Christiansen and Prof. Marcel A.J. Somers, Mechanical Engineering, Technical University of Denmark, Lyngby, Denmark

8:50 a.m.
Integrating Cryogenic Treatment With Nitro-Carburizing to Improve Performance of Aisi H-13 Tool Steel: Mr. Valmik Bhavar, **Mr. Shreyans Khot**, Mr. Prakash Kattire and Dr. RKP Singh, Research and development, KCTI, Bharat forge Ltd. Pune, India, Pune, India

9:10 a.m.
Cryogenic (NDT)—Transition Detection/Phase Transformation: Mr. Victor Sloan, Victor Aviation Service, Inc, Palo Alto, California

Residual Stress Symposium - Introduction I
8:30–10:10 a.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Michael Hill
Session Chair: Dale Ball

8:30 a.m.
An Overview of the Analysis of Bulk Residual Stresses in Aerospace Components: Dr. Rollie Dutton, Manufacturing and Industrial Technologies Division, Air Force Research Laboratory, Wright-Patterson AFB, Ohio

8:50 a.m.
The Evolution of Bulk Residual Stress and Distortion Modeling Under the Metals Affordability Initiative: Dr. M. G. Glavicic, Rolls-Royce Corporation, Indianapolis, Indiana

9:30 a.m.
Process Induced Distortion and Residual Stresses in Aerospace Parts: Mr. James B. Castle, Boeing Research and Technology, The Boeing Company, Saint Louis, Missouri

10:10–10:30 a.m.
Networking Break with Exhibitors
Meeting Room: Regency Ballroom A

Advanced Thermal Processing II - High Energy Processes
10:30 a.m.–12:30 p.m.
Meeting Room: Regency Ballroom C

Session Chair: Robert Goldstein
Session Chair: Robert Cryderman

10:30 a.m.
INDUCTION HARDENING OF SHAFTS AND SHAFT-LIKE COMPONENTS: Dr. Valery Rudnev, William West, Aaron Goodwin and Steve Fillip, 32251 N.Avis Dr., Inductoheat, Madison Heights, Michigan

10:50 a.m.
Effects of the Inductive Hardening Process on The Martensitic Structure of a 50CrMo4 steel: Ms. Annika Vieweg, Gerald Ressel, Petri Prevedel, Stefan Marsoner and Reinhold Ebner, Materials Center Leoben Forschung GmbH, Leoben, Austria

11:10 a.m.
Minimizing Case/Core Initiated Failures in Induction Hardened Components: Mr. Michael A. Pershing, Mr. Gary Raab and Mr. Weizhou Li, Caterpillar Inc., East Peoria, Illinios

11:30 a.m.
Induction Camshaft Hardening Technology With Practically Undetectable Destortion: Gary Doyon, **Dr. Valery Rudnev**, John Maher, Randy Minnick and Glen Desmier, 32251 N.Avis Dr., Inductoheat, Madison Heights, Michigan

11:50 p.m.
Local Hardening of Ductile Cast Iron—The Importance of Temperature: Mr. David A Guisbert, QA Metallurgical Services LLC, Niles, Michigan

12:10 a.m.
Effect of the Surface Morphology And Surface Finish on the Corrosion Resistance of Heat Treated Ti6al4v Via Direct Metal Laser Sintering: Ms. Yangzi Xu[1], Mr. Yuan Lu[2], Prof. Jianyu liang[1] and Prof. Richard D Sisson[1], [1]Worcester Polytechnic Institute, Worcester, Massachussetts, [2]Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts

Materials Characterization I
10:30 a.m.–12:30 p.m.
Meeting Room: Regency Ballroom B

Session Chair: David Van Aken
Session Chair: Richard Sisson

10:30 a.m.
Martensite Lattice Parameter Measured by Modern X-Ray Diffraction in Fe-C Alloy: Mr. Yuan Lu, Mr. Haixuan Yu, Ms. Xiaoqing Cai, Prof. Yiming (Kevin) Rong and Prof. Richard D. Sisson, Jr., Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts

10:50 a.m.
In situ X-Ray Diffraction Investigations of Martensitic Transformation And Austenite Modifications During Quenching of Low Alloy Steels: Mr. Jeremy Epp, Foundation Institute of Materials Science, Bremen, Germany

11:10 a.m.
Hardness-Toughness Relationship of a Boron Alloyed Quench and Tempering Steel After Different Heat Treatment Cycles: Prof. Reinhold S. E. Schneider[1], **Mrs. Yuri Toshima**[2], Mrs. Katharina Steineder[1] and Prof. Masahiro Okumiya[2], [1]Univ. of Appl. Sciences Upper Austria, Wels, Austria, [2]Toyota Technological Institute, Nagoya, Japan

11:30 a.m.
Close Relations Between Metallic Materials, Heat Treatment and Thermochemical Treatment on the Microstructure: Contribution of Metallographic Examinations Performed on Industrial Parts Through Several Case Studies.: Mr. Patrick Jacquot, Bodycote, Pusignan, France

11:50 a.m.
Microstructural Analysis of Carbides in Steel by Electrochemical Extraction Technique: Mr. Haixuan Yu[1], Mr. Yuan Lu[2] and Ms. Xiaoqing Cai[2], [1]Worcester Polytechnic Institute, Worcester, Massachussetts, [2]Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts

12:10 p.m.
Study of Phase Transformations During Tempering of AISI L6 Low Alloy Tool Steel By Means of Dilatometry and High Temperature X-Ray Diffraction: Mr. Douglas Quiñones, CIDET, Universidad Autonoma de Nuevo Leon, Facultad de Ingenieria Mecanica y Electrica., San Nicolas de los Garza, Mexico

Residual Stress Symposium - Introduction II
10:30 a.m.–12:30 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: James Castle
Session Chair: Mike Glavicic

10:30 a.m.
Bulk Residual Stress Effects on Structural Fatigue —The Integrated Computational Structures Engineering (ICSE) Approach: Dr. Dale L. Ball, Lockheed Martin Aeronautics Company, Fort Worth, Texas

11:10 a.m.
The FEP Framework To Address Challenges in Residual Stress Measurement And Prediction: Mr. Vasisht Venkatesh, Pratt & Whitney, East Hartford, Connecticut

11:30 a.m.
Metals Affordability Initiative ICME related Residual Stress Modeling for Ni Disks—Material/ Process Sensitivity, Distortion, and V&V: Dr. M.G. Glavicic, Mr. Robert Goetz and Mr. Kong Ma, Rolls-Royce Corporation, Indianapolis, Indiana

11:50 a.m.
Measurement of Residual Stress in Aerospace Materials: Mr. Michael R. Hill and Dr. Adrian T. DeWald, Hill Engineering, LLC, Rancho Cordova, California

12:30–1:30 p.m.
Lunch with Exhibitors
Meeting Room: Regency Ballroom A

Nitriding II
1:30–3:10 p.m.
Meeting Room: Regency Ballroom B

Session Chair: Patrick Jacquot
Session Chair: Tobias Steiner

1:30 p.m.
Low Temperature Nitriding of Strain Induced Martensite and Laser Quenched Austenite : Dr. Vojteh Leskovsek, Heat Treatment and Surface Engineering Department, Institute of Metals and Technology, Ljubljana, Slovenia

1:50 p.m.
Influence of Stress and Strain Hardening on Gaseous Nitriding: Mr. Benjamin Guillot, Dr. Sébastien Jégou and Prof. Laurent Barrallier, MSMP Laboratory, MSMP Laboratory, Arts et Métiers ParisTech, Aix-en-Provence, France, Aix-En-Provence, France

2:10 p.m.
Low Temperature Surface Hardening of Stainless Steel; The Role of Plastic Deformation : Mr. Federico Bottoli[1], Ms. Freja. N. Jespersen[1], Prof. Jesper H. Hattel[2], Prof. Grethe Winther[1], Dr. Thomas Christiansen[1] and **Prof. Marcel A.J. Somers**[1], [1]Mechanical Engineering, Technical University of Denmark, Lyngby, Denmark, [2]Department of Mechanical Engineering, Technical University of Denmark, Lyngby, Denmark

2:30 p.m.
Effects of Different Microstructural and Hardness Gradients Generated by Single and Combined Surface Treatments With a Nitriding Top Layer: Dr. Anja Buchwalder[1], Mr. Normann Klose[1], Prof. Rolf Zenker[1,2], Prof. Heinz-Joachim Spies[1] and Mrs. Anne Jung[1], [1]TU Bergakademie Freiberg, Institute of Materials Engineering, Freiberg, Germany, [2]Zenker Consult, Mittweida, Germany

2:50 p.m.
Optimization of Gaseous Nitriding of Steels By Multi-Physics Modeling: Prof. Laurent Barrallier[1], **Dr. Sébastien Jégou**[1] and Mr. Guillaume Fallot[2], [1]MSMP Laboratory, MSMP Laboratory, Arts et Métiers ParisTech, Aix-en-Provence, France, Aix-En-Provence, France, [2]ETLM, Airbus Helicopters, Marignane, France, Marignane, France

Quenching and Quenchants II
1:30–2:50 p.m.
Meeting Room: Regency Ballroom C

Session Chair: David Guisbert
Session Chair: Imre Felde

1:30 p.m.
Selection of Quenchants: Dr. Scott Mackenzie, Houghton International Inc., Valley Forge, Pennsylvania

1:50 p.m.
Why Fine Filtering For Quench Oil Systems Is A Must!: Mr. Jimmy Pfaffenberger, CC Jensen, Newnan, Georgia

2:10 p.m.
The New Industry Benchmark For Pipe and Bar Quench: Mr. Pietro Della Putta[1] and **Mr. Mario Fabro**[2], [1]Furnaces & Heat Treatment Dept., SMS Meer S.p.A., Tarcento (UD), Italy, [2]Long Products, SMS USA, LLC, Pittsburgh, Italy

2:30 p.m.
A New Probe to Measure and Evaluate the Real Quenching Intensity Based on Temperature Gradients: Prof. Bozidar Liscic[1], Prof. Bozidar Matijevic[1], **Dr. George E. Totten**[2] and Dr. Lauralice de C. F. Canale[3], [1]Department of Materials, Faculty for Mech. Engineering, University of Zagreb., Zagreb, Croatia, [2]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon, [3]Departamento de Engenharia de Materiais – SMM, Universidade de São Paulo, São Carlos-SP, Brazil

Residual Stress Symposium I
1:30–3:10 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Lynn Ferguson
Session Chair: Pam Kobryn

1:30 p.m.
Experiences With Residual Stress Modeling and Material Characterization in the Ba-11 Program For Aluminum Forgings: Dr. Mark A. James, Aerospace, Alcoa, Inc., Alcoa Center, Pennsylvania

2:10 p.m.
CFD Quenching Simulation using Experimentally Determined Flow Boiling Database: Mr. Andrew L. Banka and Dr. Jeffrey D. Franklin, Airflow Sciences Corporation, Livonia, Michigan

2:50 p.m.
Distortion Potential of Cold Forming Prior to Induction Heat Treatment Processes: Mr. Dawid Nadolski[1], Dr. Alwin Schulz[1] and **Prof. Hans-Werner Zoch**[2], [1]Heat Treatment, Stiftung Institut für Werkstofftechnik (IWT), Bremen, Germany, [2]Stiftung Institut für Werkstofftechnik (IWT), Bremen, Germany

3:10–3:30 p.m.
Refreshment Break
Meeting Room: Ballroom Foyer

Coating Technology (Thermal Spray, PVD, CVD...)
3:30–4:10 p.m.
Meeting Room: Regency Ballroom B

Session Chair: Christoph Laumen
Session Chair: Rolf Zenker

3:30 p.m.
Production, Examination and Application of Modern Composite Materials With Nano-Carbo Dispersion Phase: Prof. Tomasz Babul and Mrs. Anna Olbrycht, Institute of Precision Mechanics, Warsaw, Poland

3:50 p.m.
Characterizations of Alternating Current Field Enhanced Pack Aluminizing at Medium and Low Temperatures: Prof. Fei Xie[1,2], Mr. Zhichao Huang[1] and Mr. Menglong Yan[1], [1]Materials Science and Engineering School, Changzhou University, Changzhou, China, [2]Key Laboratory of Materials Surface Technology of Jiangsu Province, Changzhou University, Changzhou, China

Materials Characterization II
3:30–5:30 p.m.
Meeting Room: Regency Ballroom C

Session Chair: Božo Smoljan
Session Chair: Joseph Newkirk

3:30 p.m.
Hardenability Characterization and Microstructural Evolution in Heavy Gauge Plate Steels: Mr. Igor Vieira and Dr. Emmanuel De Moor, Colorado School of Mines, Golden, Colorado

3:50 p.m.
Influence of Cooling And Heating Rates on the Thermal Properties of Ni-Ti Shape Memory Alloy: Mrs. Boutheina Ben Fraj and Prof. Zoubeir TOURKI, Mechanical laboratory of Sousse, National Engineering School of Sousse, University of Sousse, Sousse, Tunisia

4:10 p.m.
Thermal Diffussivity in Cast Aluminum Alloys: Prof. Rafael Colas[1], Humberto Arenas-Garcia[1], Alma G. Esmeralda[1], Andrés Rodríguez[2] and Dr. José Talamantes-Silva[3], [1]Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Mexico, [2]Research and Development, Nemak, S.A. de C.V., García, Mexico, [3]Nemak México, S.A. de C.V., García, Mauritius

4:30 p.m.
Study of Phase Transformations During Tempering of AISI L6 Low Alloy Tool Steel by Means of Calorimetry: Mr. Douglas Quiñones, CIDET, Universidad Autonoma de Nuevo Leon, Facultad de Ingenieria Mecanica y Electrica., San Nicolas de Los Garza, Mexico

4:50 p.m.
Influence of UNSM Treatment Temperature on Microstructure and Mechanical Properties of Inconel 600: Mr. Jun-Hyong Kim, Mr. Hak-Doo Kim, Dr. Auezhan Amanov and Prof. Young-Sik Pyun, Mechanical Engineering, Sun Moon University, Asan, South Korea

5:10 p.m.
Influence of Heat Treatment On Fatigue and Fracture Toughness Behavior of AISI 4140 Steel: Mr. Pravin Jadhav[1], Prof. R.C. Prasad[2], Mr. Rajesh Mane[3], Mr. Manoj Ukhande[4] and Mr. Suresh Arangi[5], [1]Kalyani Centre for Technology and Innovation, Bharat Forge Ltd., Pune, India, [2]Metallurgical Engineering and Material Science, Indian Institute of Technology Bombay, Mumbai, India, [3]FTL & CAE, Bharat Forge, Ltd., Pune, India, [4]FTL & CAE, Bharat Forge Ltd., Pune, India, [5]MQC, Bharat Forge Ltd., Pune, India

Residual Stress Symposium II
3:30–5:10 p.m.
Meeting Room: Regency Ballroom DEF

Session Chair: Mark James
Session Chair: Andrew Banka

3:30 p.m.
Prediction of Quench-Induced Residual Stresses in Al-Cu-Mg Impeller Forgings: Dr. Denis Carron[1], Dr. Nicolas Chobaut[2], Dr. Peter Saelzle[3] and Dr. Jean-Marie Drezet[2], [1]Limatb, Université Bretagne Sud, Lorient, France, [2]Laboratoire de Simulation des Matériaux, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, [3]ABB Turbo Systems Ltd, Baden, Switzerland

3:50 p.m.
Study of Residual Stresses and Distortions After Steel Quenching With Vegetable Oils: Dr. Rosa L. Simencio Otero[1], Dr. Lauralice Canale[2], **Dr. George E. Totten**[3], Prof. Barbara Rivolta[4], Dr. Carlotta Civera[5] and Dr. J.C. Lucio[2], [1]University of Sao Paulo, São Carlos-SP, Brazil, [2]Departamento de Engenharia de Materiais – SMM, Universidade de São Paulo, São Carlos-SP, Brazil, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon, [4]Meccanica, Politecnico di Milano, Milano, Italy, [5]Siderval Spa, Talamona, Italy

4:10 p.m.
Paralell PSO Method for Estimation Heat Transfer Coefficients: Dr. Imre Felde, University of Obuda, Budapest, Hungary

4:30 p.m.
Residual Stress and Bending Fatigue Strength in Carburized and Quench Hardened Pyrowear 53 Steel Gears: Dr. B. Lynn Ferguson[1], Mr. Andrew M Freborg[2] and Dr. Zhichao (Charlie) Li[2], [1]DANTE Solutions, Inc, Cleveland, Ohio, [2]DANTE Solutions, Inc., Cleveland, Ohio

4:50 p.m.
The Development of a Process-Structure-Properties-Performance (PSPP) Map for Aluminum-Zinc-Magnesium-Copper Alloys Used In Aircraft Applications: Dr. Ashley Goulding[1,2], Dr. Richard W. Neu[1,2] and Dr. Tom H. Sanders[1], [1]School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, Georgia, [2]The George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia

6:30–8:30 p.m.
Networking Dinner and The Linde Group Poster Award

THURSDAY, APRIL 21, 2016

7:30–8:30 a.m.
Continental Breakfast
Meeting Room: Regency Ballroom Foyer

Advanced Thermal Processing III
8:30–10:10 a.m.
Meeting Room: Ballroom C

Session Chair: Richard Sisson

8:30 a.m.
Future Trends of Low Temperature Surface Hardening of Stainless Steel: Mr. Karl Andreas[1], Ms. Martina Wagner[1] and Mr. Patrick Jacquot[2], [1]Bodycote, Landsberg, Germany, [2]Bodycote, Pusignan, France

8:50 a.m.
Computer Modeling of Induction Thermal Processing of Ferrous and Non-Ferrous Alloys: Collin Russell and **Dr. Valery Rudnev**, 32251 N.Avis Dr., Inductoheat, Madison Heights, Michigan

9:10 a.m.
Modeling of the Heating Sequences of Lightweight Bimaterial Billets For Hot Forging: Mr. Robert C. Goldstein[1], Dr. Xi Yang[2], Dr. Bulent Chavdar[3] and Dr. B. Lynn Ferguson[4], [1]Fluxtrol Incorporated, Auburn Hills, Michigan, [2]General Motors, Pontiac, Michigan, [3]Eaton, Southfield, Michigan, [4]DANTE Solutions, Inc, Cleveland, Ohio

9:30 a.m.
Influence of Synthesis on the Mechanical Properties of Sintered and Nanoporous Copper: Mr. Alexander P. Moore, Dr. Rakesh Kumar Behera, Mr. David Carroll, Dr. Chaitanya S. Deo and Dr. Antonia Antoniou, Georgia Institute of Technology, Atlanta, Georgia

9:50 a.m.
Effect of Laser Parameters on Hardness,Wear & Residual Stresses of H13 Steel: Mr. Shreyans Khot, Mr. Valmik Bhavar and Dr. RKP Singh, Research and development, KCTI, Bharat forge Ltd. Pune, India, Pune, India

Tribology and Wear of Engineered Surfaces
8:30–9:30 a.m.
Meeting Room: Ballroom B

Session Chair: Jeremy Epp

8:30 a.m.
Influence of Ultrasonic Nanocrystal Surface Modification Treatment Temperature on Microstructure and Tribological Behavior of Heat-treated and Non-heat Treated Bearing Steel: Dr. Auezhan Amanov, Mr. Jun-Hyong Kim and Prof. Young-Sik Pyun, Mechanical Engineering, Sun Moon University, Asan, South Korea

8:50 a.m.
Effect of Thermomechanical Treatment on Erosion Behaviors of 4343/3xxx Aluminum Clad Sheets during Brazing Heat Treatment: Dr. Kwangjun Euh and Dr. Hyoung WooK Kim, Light Metals Department, Korea Institute of Materials Science, Changwon, South Korea

9:10 a.m.
The Erosion Behavior of Die-Steel Salt-Bath-Nitrocarburized with Lithium-Iron Compound Oxide Layer in Molten Al-Si-Cu Alloy: Ms. Haruna ISHIZUKA, Mr. Yuya Hirai and Dr. Youichi Watanabe, Parker Netsushori Kogyo Co., Ltd., Kanagawa-ken, Japan

Residual Stress Symposium III
8:30–9:50 a.m.
Meeting Room: Ballroom DEF

Session Chair: Vasisht Venkatesh
Session Chair: Hans-Werner Zoch

8:30 a.m.
Metallurgical Aspects of Distortion and Residual Stresses in Heat Treated Parts: Dr. D. Scott MacKenzie, Houghton International, Valley Forge, Pennsylvania

8:50 a.m.
Modeling and numerical Simulation of Quenching Processes of AISI 4140 Steel and Validation: Mr. Wei Shi[1], Fei-long NIU[2], Dr. Imre Felde[3] and Guo JIN[2], [1]Department of Mechanical Engineering, Tsinghua University, Beijing, China, [2]College of Materials Science and Chemical Engineering, Harbin Engineering University, Nangang, China, [3]University of Obuda, Budapest, Hungary

9:10 a.m.
Surface Structuring as a Method to Influence on Rewetting During Liquid Quenching: Mr. Nikolay Kozlov and Prof. Olaf Keßler, Chair of Materials Science, University of Rostock, Rostock, Germany

9:30 a.m.
Influence of Design on Distortion of Oil Quenched Gear Base Bodies: Dr. Thomas Luebben and Dr. Holger Surm, Heat Treatment, Stiftung Institut für Werkstofftechnik (IWT), Bremen, Germany

10:10–10:30 a.m.
Refreshment Break
Meeting Room: Regency Ballroom Foyer

Carburizing and Nitrocarburizing
10:30 a.m.–12:30 p.m.
Meeting Room: Ballroom B

Session Chair: Emilia Wolowiec-Korecka

10:30 a.m.
Simulation of the Effects of Temperature and Time on the Tempering Behavior of Carburized Steels: Mr. Yongjin Kim[1], Ms. Xiaoqing Cai[2], Mr. Haixuan Yu[3] and Mr. Lei Zhang[2], [1]Materials Science and Engineering, Center for Heat Treating Excellence (CHTE), Worcester, Massachussetts, [2]Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts, [3]Worcester Polytechnic Institute, Worcester, Massachussetts

10:50 a.m.
Novel Pack Cementations: Alternating Current Field Enhanced Pack Cementations: Prof. Fei Xie[1,2], Mr. Shaoqiang Xu[1] and Mr. Jianwei Pan[3], [1]Materials Science and Engineering School, Changzhou University, Changzhou, China, [2]Key Laboratory of Materials Surface Technology of Jiangsu Province, Changzhou University, Changzhou, China, [3]Huaide College, Changzhou University, Changzhou, China

11:10 a.m.
Fluidized-Bed Carburizing in Chemically Active Powders of C22 Steel: Mr. Aleksander Ciski[1], Prof. Tomasz Babul[1], Konrad Lankiewicz[1], Jana Niznanska[2] and Pavel Suchmann[2], [1]Institute of Precision Mechanics, Warsaw, Poland, [2]COMTES FHT, Pilsen, Czech Republic

11:30 a.m.
An Enhancement to the Low Pressure Carburizing Simulation: Mr. Lei Zhang, Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts

11:50 a.m.
Pre-Nit Technology For Accelerated Vacuum Carburizing: Mr. Michael Lister, Vacuum, Seco/Warwick, Meadville, Pennsylvania

12:10 p.m.
In-Line, High-Volume, Low-Distortion, Precision Case Hardening For Automotive, Transmission And Bearing Industry: Dr. Maciej Korecki[1] and Dr. Emilia Wolowiec-Korecka[2], [1]Seco/Warwick, Swiebodzin, Poland, [2]Institute of Materials Science and Engineering, Lodz University of Technology, Lodz, Poland

Advanced Thermal Processing IV
10:30 a.m.–12:10 p.m.
Meeting Room: Ballroom C

Session Chair: Joseph Newkirk

10:30 a.m.
Grain Refinement Strategies in High Strength Cast Steel: Prof. David C. Van Aken, Dr. Terrell O. Webb and Mr. Joshua Green, Materials Science & Eng., Missouri University of Science and Technology, Rolla, Missouri

10:50 a.m.
Modeling the Mechanical Properties of Quenched And Tempered Martensitic Steels: Ms. Xiaoqing Cai[1], Mr. Yuan Lu[1] and Prof. Richard D Sisson[2], [1]Center for Heat Treating Excellence, Worcester Polytechnic Institute, Worcester, Massachussetts, [2]Worcester Polytechnic Institute, Worcester, Massachussetts

11:10 a.m.
Thermodynamic and Kinetic Simulation And Experimental Results Homogenizing Advanced Alloys: Dr. Paul D. Jablonski, Dr. Joseph J. Licavoli and Dr. Jeffrey A. Hawk, National Energy Technology Laboratory, Albany, Oregon

11:30 a.m.
Improvement in Creep Rupture Ductility of Creep Strength Enhanced Ferritic Steel by New Heat Treatment Process with Intermediate Tempering: Dr. Kazuhiro Kimura and Dr. Kota Sawada, National Institute for Materials Science, Tsukuba, Japan

11:50 p.m.
Evaluation of Mechanical and Fatigue Properties of Weld Deposit and its Comparison with that of Die Steel: Mr. Sachin Sitaram Patil, Mr. Shreyas Shashank Kirwai, Mr. Santosh Kumar, Mr. Atul Ramdas Patil, Mr. Jayant Bhaurao Mane and Dr. Rajkumar P Singh, Kalyani Centre for Technology & Innovation, Bharat Forge Ltd., Pune, India

Residual Stress Symposium IV
10:30–11:10 a.m.
Meeting Room: Ballroom DEF

Session Chair: Scott MacKenzie
Session Chair: David Furrer

10:30 a.m.
Mathematical Modeling and Computer Simulation of Non-monotonic Continous Quenching: Prof. Božo Smoljan, Dr. Dario Iljkić and N/A Lovro Štic, Department of Materials Science and Engineering, Faculty of Engineering, University of Rijeka, Rijeka, Croatia

10:50 a.m.
Using Heat Treat Simulation to Characterize Sensitivity of Quench Hardening Response in Hot Mill Steel Work Rolls: Mr. Andrew M Freborg, Dr. Zhichao (Charlie) Li and Dr. B. Lynn Ferguson, DANTE Solutions, Inc., Cleveland, Ohio

Lunch and Closing Session:
Residual Stress Panel Discussion
12:30–1:30 p.m.
Meeting Room: Ballroom DEF

Session Chair: Pam Kobryn
Session Chair: David Furrer

Please join us for a lively debate and discussion of the following:

- What is the state of the art in Residual Stress prediction? Will Residual Stress be defined as a critical attribute for future manufactured products, and why?
- How reliable are the prediction?
- Will Residual Stress be a required attribute that will flow down through the supply chain?

Panel Members:
Mr. Michael Hill
Prof. Hans-Werner Zoch
Mr. Vasisht Venkatesh
Dr. Dale Ball
Dr. Lynn Ferguson

1:45–2:00 p.m.
Closing Remarks and Award Presentation
- **Tom Bell Young Author Award**

POSTER PROGRAM

LOCATION: REGENCY BALLROOM FOYER

Uphill Quenching of Aluminum Alloys: A Process Review: Ms. Wellington Mattos[1], **Dr. George E. Totten**[2,3], Dr. D. Scott MacKenzie[4], Mr. Tom Croucher[5] and Dr. Lauralice Canale[1], [1]Departamento de Engenharia de Materiais – SMM, Universidade de São Paulo, São Carlos-SP, Brazil, [2]G.E. Totten & Associates, LLC, Seattle, WA, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon, [4]Houghton International, Valley Forge, Pennsylvania, [5]Croucher Associates, Norco, California

Characterization of BN/TiBN/TiN Multilayer Coatings prepared by Pulsed dc Plasma-Enhanced Chemical Vapor Deposition: Dr. Kazuki Kawata and Mr. Toru Kidachi, Research and Development, Oriental Engineering Co., Ltd., Kawagoe, Japan

Effect of Deep Cryogenic Treatment on Fracture Toughness of 300M Steel Using Circumferentially Notched Kic Test Specimens: Mr. Daniel Schuller[1], **Dr. Vojteh Leskovsek[2]** and Dr. Lauralice Canale[1], [1]Departamento de Engenharia de Materiais – SMM, Universidade de São Paulo, São Carlos-SP, Brazil, [2]Heat Treatment and Surface Engineering Department, Institute of Metals and Technology, Ljubljana, Slovenia

Effect of Quenching and Tempering in Microalloyed Steels Containing Boron and Titanium: Dr. André Itman F.[1], Mr. João Batista Ribeiro Martins[2], Mr. Wagner Monteiro Souza[2], Dr. Rosana Vilarim[3], Dr. Luiz C. Casteletti[4] and Dr. George E. Totten[5], [1]Metallurgical and Materials, Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo (IFES), Vitoria - ES, Brazil, [2]Metallurgical, ArcelorMittal, Serra-ES, Brazil, [3]Metallurgical and Materials, Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo, Vitoria - ES, Brazil, [4]Materials Engineering, EESC-USP (Escola de engenharia de São Carlos - Universidade de São Paulo), São Carlos, Brazil, [5]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon

Application of Nano-Structured Copper-Polymer Catalyst for Activation of Gas Nitriding of Steels: Prof. L.G. Petrova, Prof. I.M. Papisov, Prof. I.S. Belashova, Dr. V.A. Aleksansrov, Dr. G.Yu Ostaeva, Dr. A.I. Papisova and Mr. A.E. Perekrestov, Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Development of a Laboratory Intensive Quenching (IQ) System: Mr. Luigi Leonardo Mazzucco Albano[1], Dr. George E. Totten[2], Fernando S. Misina[1] and Dr. Lauralice de C. F. Canale[1], [1]Department of Materials Engineering, University of SÃ£o Paulo, SÃ£o Carlos/SP, Brazil, [2]SÃ£o Paulo State University-USP, Seattle, Brazil

Effects of Quench and Partitioning Heat Treatment in Mechanical Properties and the Microstructural Characterization of AISI 300M Steel: Prof. Ricardo Gratão Gregui[1], **Dr. Lauralice Canale**[2] and Mr. Danilo Assad Ludewigs[3], [1]Department of Materials, Federal Institute of Education, Science and Technology of São Paulo, Votuporanga, Brazil, [2]Departamento de Engenharia de Materiais – SMM, Universidade de São Paulo, São Carlos-SP, Brazil, [3]Industrial, Durferrit do Brasil Química, Diadema-SP, Brazil

Wear Behavior of Layers Produced by Boriding or PVD-Boriding Treatments on Aisi H13 Tool Steel: Mr. Ricardo Gomes Pereira[1], Mr. Galtiere Corrêa Rêgo[1], Dr. Luiz C. Casteletti[1], Dr. Amadeu N. Lombardi[2] and **Dr. George E. Totten**[3], [1]Materials Engineering, EESC-USP (Escola de engenharia de São Carlos - Universidade de São Paulo), São Carlos, Brazil, [2]Mechanical Engineering, Federal Technological University of Parana, Londrina, Brazil, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon

Effect of Boronizing on Wear Resistance of the Ti-6Al-4V ALLOY: Dr. Luiz C. Casteletti[1], Mr. Galtiere Corrêa Rêgo[2], Mr. Gustavo Satoru Takeya[1], Dr. Amadeu N. Lombardi[2] and **Dr. George E. Totten**[3], [1]Materials Engineering, EESC-USP (Escola de engenharia de São Carlos - Universidade de São Paulo), São Carlos, Brazil, [2]Mechanical Engineering, Federal Technological University of Parana, Londrina, Brazil, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon

Characterization of a Plasma Nitrocarburized Fe-31.2Mn-7.5Al-1.3Si-0.9C STEEL ALLOY: Mr. Gustavo Satoru Takeya[1], Mr. Fabio Edson Mariani[2], Dr. Amadeu N. Lombardi[1], Dr. Luiz C. Casteletti[2] and **Dr. George E. Totten**[3], [1]Mechanical Engineering, Federal Technological University of Parana, Londrina, Brazil, [2]Materials Engineering, EESC-USP (Escola de engenharia de São Carlos - Universidade de São Paulo), São Carlos, Brazil, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon

Oxidation Resistance of Ti-6Al-4V Hot-Dipped in Melted Al and Al-12Si Alloy: Mr. Galtiere Corrêa Rêgo[1], Mr. Gustavo Satoru Takeya[2], Dr. Amadeu N. Lombardi[2], Dr. Luiz C. Casteletti[1] and **Dr. George E. Totten**[3], [1]Materials Engineering, EESC-USP (Escola de engenharia de São Carlos - Universidade de São Paulo), São Carlos, Brazil, [2]Mechanical Engineering, Federal Technological University of Parana, Londrina, Brazil, [3]Department of Mechanical and Materials Engineering, Portland State University, Portland, Oregon

Poster Awards Sponsored By:

Poster Awards will be presented during the conference dinner on Wednesday, April 20, 2016 in the Harborside Room.

29th

HEAT TREATING SOCIETY

CONFERENCE & EXPOSITION

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CALL FOR PAPERS IS OPEN!

Heat Treat 2017, the biennial co-located show from the ASM Heat Treating Society and the American Gear Manufacturers Association, is where heat treating professionals go to take stock of the industry and predict what's coming in the future. Submit your 100-150 word abstract by December 30, 2016. Topics of interest include, but are not limited to:

- Additive Manufacturing/3D Processing
- Advances in Heat Treating
- Induction Heat Treating
- Quenching and Cooling
- Vacuum Processes and Technology

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EXHIBIT DATES AND TIMES

Location: Regency Ballroom A

Monday, April 18
Welcome Reception: 5:30–7:00 p.m.

Tuesday, April 19
Morning Refreshment Break: 10:40–11:00 a.m.
Lunch: 12:00–1:30 p.m.
Afternoon Refreshment Break: 3:10–3:30 p.m.

Wednesday, April 20
Morning Refreshment Break: 10:10–10:30 a.m.
Lunch: 12:30–1:30 p.m.

EXHIBITOR LIST

Advanced Energy	Tabletop #3
Airflow Sciences Corporation	Tabletop #5
AVL Advanced Simulation Technologies	Tabletop #8
AVS Inc.	Tabletop #16
Buehler	Tabletop #15
DANTE Solutions	Tabletop #13
ECM USA	Tabletop #11
Furnacare Inc.	Tabletop #7
H.C. Starck	Tabletop #19

HORIBA Scientific	Tabletop #6
Houghton International Inc.	Tabletop #1
Ionic Technologies	Tabletop #17
Pulstec USA, Inc.	Tabletop #18
Sajjan Precision Castings	Tabletop #10
SECO/WARWICK CORP.	Tabletop #12
Thermo-Calc Software Inc.	Tabletop #2
Toyo Tanso USA	Tabletop #14
Wickert Hydraulic Presses USA	Tabletop #9
WPX Faserkeramik GmbH	Tabletop # 4

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COMPANY PROFILES

Advanced Energy
Tabletop #3
Precision power from Advanced Energy® (AE®) enables design breakthroughs that drive growth for leading semiconductor, industrial, and solar customers. AE thermal management systems offer excellent temperature measurement and control, while AE power control modules provide exceptional quality for heating, melting, bending, forming, or drying in a variety of industrial applications.
www.advanced-energy.com

Airflow Sciences Corporation
Tabletop #5
Thirty years of CFD modeling experience combined with cutting edge boiling model research provides accurate assessments of quenching processes, augmenting or replacing thermocouple quench trials. Airflow Sciences Corporation's analysis techniques have optimized heat treat processes such as furnace uniformity, high pressure gas quenching, air quenching, controlled cooling, and intensive quenching.
www.airflowsciences.com

AVL Advanced Simulation Technologies
Tabletop #8
www.avl.com

AVS Inc.
Tabletop #16
AVS has produced high temperature furnaces for the past 49 years. We are pleased to announce our new line of high pressure quench furnaces called "HI Bar", available in standard sizes and pressures from 6- 20 bar. Custom designs are available up to 200 bar to complement our 3000°C furnace lines.
www.avsinc.com

Buehler
Tabletop #15
Buehler, an ITW company, is a manufacturer of scientific instruments and supplies for Microstructural Analysis (sectioning, mounting, grinder/polishers, Wilson hardness testers, OmniMet imaging systems) and the finest quality consumables in the market for consistent sample prep results. Since 1936, Buehler has been innovating solutions and providing laboratory assistance to customers worldwide.
www.buehler.com

DANTE Solutions
Tabletop # 13
DANTE Solutions, Inc. is an engineering solutions provider that specializes in improving heat treatment processes for steel components. Combining the expertise of metallurgists and mechanical engineers, we use our DANTE software tool to simulate carburizing and quench hardening processes to accurately predict dimensional change, metallurgical phases, hardness and residual stress.
www.dante-solutions.com

ECM USA
Tabletop #11
ECM Technologies started manufacturing heat-treatment furnaces in 1928. Since that time, ECM personnel have been committed to extending their knowledge in the field of temperature control, high pressures, vacuum and the behavior of materials. This concern has forged ECM USA's recognized spirit of innovation. Call to see how ECM-USA can improve your process: 262-605-4810.
www.ECM-USA.com

Furnacare Inc.
Tabletop #7
Furnacare is a supplier of after sales services based in US and fully dedicated to provide technical assistance and spare parts for vacuum furnaces of any type and any brand. Among the provided services are leak detections, TUS/SAT tests, calibrations, hot zones repairs, upgrades of electrical cabinets, pumps repairs etc.
www.furnacare.com

H.C. Starck
Tabletop #19
H.C. Starck's trusted supply chain of refractory pure and alloyed materials for heat treating medical, aerospace, defense and automotive products, showcases our innovativeness, commitment to quality, and extensive technological expertise. We work side-by-side with our customers along the entire value-creation chain, supporting them as an expert partner in developing creative solutions.
www.hcstarck.com

HORIBA Scientific
Tabletop #6
Products for solids samples analysis. C/S/O/N/H elemental analyzers & Glow Discharge Spectrometers for bulk and surface analysis. PP-TOF-MS for advanced depth profile analysis with lower detection limits. 3D Metal Glow Discharge system uses multi-channel technology for bulk analysis of metals and rapid depth profiling of thick layers. New EMIA Pro/EMIA Expert Carbon/Sulfur analyzers offer NDIR measurement capabilities.
www.horiba.com/scientific

Houghton International Inc.
SPONSOR
Tabletop #1
Houghton is the world leader in heat treatment technology and application expertise across a wide range of industries. We supply pre-treatment cleaners, cold quenching oils, martempering oils, aqueous quenchants, and final cleaning and temper rust protection. Breakthrough techbiostable Aqua-Quench® polymer quenchants provide superior results.
www.houghtonintl.com

Ionic Technologies
Tabletop #17
In 1998 Ionic Technologies, Inc. was established in Greenville, South Carolina, through a partnership with Aalberts Industries of Doorn, Netherlands. The company's vision is to offer the metal working industry the highest level of Ion, Gas, and Solution Nitriding and Vacuum Heat Treatment services for all types of metals.
www.ionic-tech.com

Pulstec USA, Inc.
Tabletop #18
Pulstec provides non-destructive X-ray diffraction(XRD) based stress analyzer. This small, light-weight, low-cost, low-radiation-dose, fast-cycletime analyzer can measure Residual-Stress, FWHM and Retained-Austenite by detecting the full Debye ring's profile from single incident X-ray angle. Ideal to use in lab or on-site.
www.pulstec.net

Sajjan Precision Castings
Tabletop #10
Sajjan is specialized in manufacturing of Heat Treat Fixtures, Furnace Spares, Furnace Rails and Rollers, Radiant Tubes, Furnace Rolls, Base Trays, Loading Rods, Charge Baskets for Commercial Heat Treaters and Furnace Manufacturers thru Lost Wax and Refractory metal Casting Process.
www.sajjancastingslimited.com

SECO/WARWICK CORP.
Tabletop #12
SECO/WARWICK is a leading global manufacturer of heat processing furnaces and equipment. Expertise includes furnaces and equipment in five categories: vacuum heat treatment; atmosphere heat treatment; controlled atmosphere brazing of aluminum heat exchangers; melting, holding, and thermal processing of aluminum; and vacuum metallurgy. SECO/WARWICK Group has seven companies located on four continents with customers in nearly 70 countries.
www.secowarwick.com

Thermo-Calc Software Inc.
Tabletop #2
A leading developer of software and databases for computational thermodynamics and diffusion simulations for multicomponent systems. Thermo-Calc: for thermodynamic and phase equilibria calculations. DICTRA: for accurate simulations of diffusion controlled transformations. TC-PRISMA: for predictions of precipitation kinetics. Databases available for steels, Ni-superalloys, Al, Mg, Ti, alloys, HEAs and other materials.
www.thermocalc.com

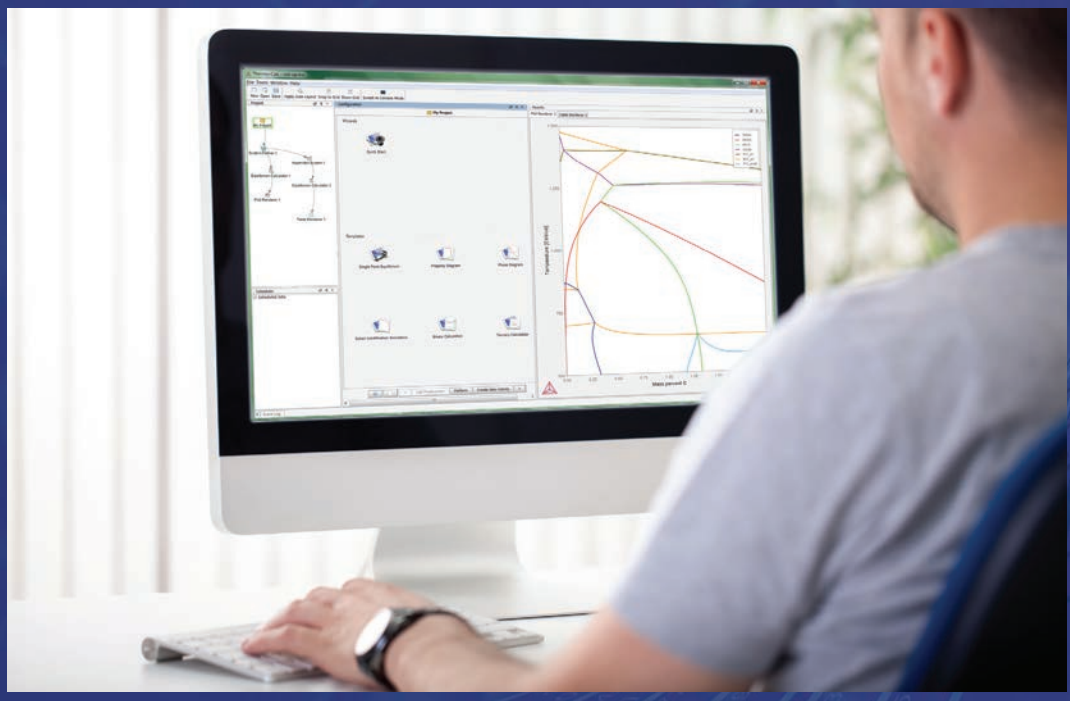
Toyo Tanso USA
Tabletop # 14
Toyo Tanso is the premier manufacturer of Iso-Molded Graphite & Carbon Fiber Composites in the world. Toyo Tanso is known industry wide for quality and consistency. Toyo Tanso is at the forefront of innovation in the thermal processing world offering customized and unique solutions for customers.
www.ttu.com

Wickert Hydraulic Presses USA
Tabletop #9
Wickert hydraulic press systems 110+ year history provides the basis for consulting, engineering, and integration of solutions to deliver a turnkey fixturing heat treat cell. Our goal is to deliver reliable throughput production capacity. Wickert press systems has provided engineered flexible systems for a multitude of different parts small to large batch running in one heat treat system.
www.wickert-usa.com

WPX Faserkeramik GmbH
Tabletop # 4
WHIPOX (R) oxide fiber ceramics sustains extreme mechanical and thermal shocks (1000 °F / sec), shows minimal oxidation/corrosion, and no warping. This enables process improvements in the heat treatment of steel with respect to output quality, process uptime, and energy efficiency. WHIPOX (R) is e.g. used in combination with CFC charge carriers to avoid Carbon contamination of workpieces. In contrast to CFC, WHIPOX (R) charge carriers can be used in oxidizing atmospheres. WPX supplies renown automotive OEMs.
www.whipox.com

Thermo-Calc Software

Thermodynamic and Kinetic Simulation Software



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Refractory, oxides, slags	Geochemical	High Temp. superconductors

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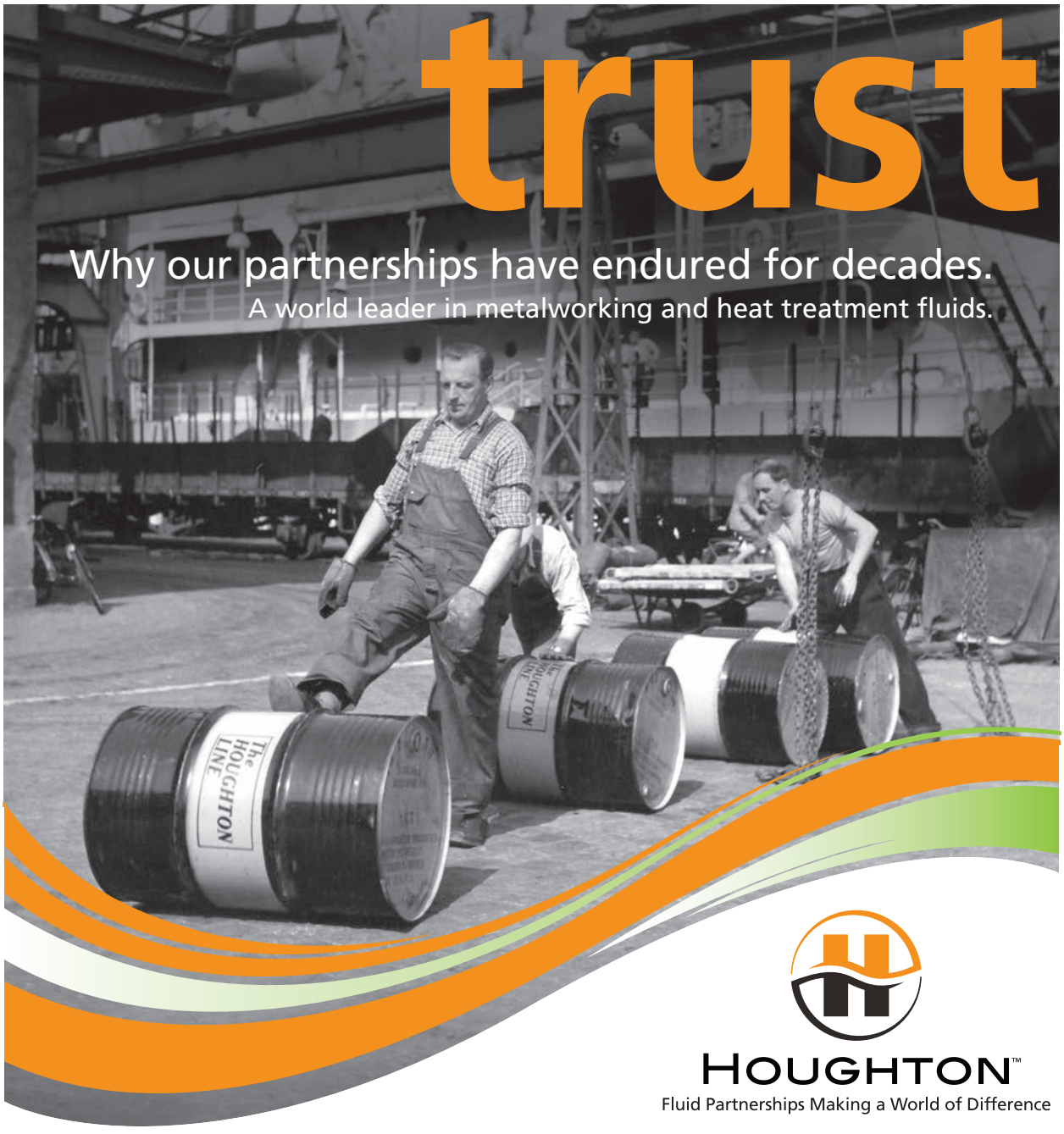

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