

Table of Contents to Papers

Scroll to the title and select a **Blue** link to open a paper. After viewing the paper, use the bookmarks to the left to return to the beginning of the Table of Contents to Papers.

Atmosphere Technology

Evaluation of Process Control Methods for Nitrogen-Hydrocarbon Atmospheres	1
<i>Xiaolan Wang¹, Zbigniew Zurecki², and Richard D. Sisson, Jr.¹</i>	
<i>(1) Worcester Polytechnic Institute, Worcester, MA, USA</i>	
<i>(2) Air Products & Chemicals, Inc., Allentown, PA, USA</i>	
Independently Controlled Carbon and Nitrogen Potential – A New Approach to Carbonitriding Processes	9
<i>Karl-Michael Winter, Process-Electronic GmbH, Heiningen, Germany</i>	
Capitalizing on Current Technology Used in Data Acquisition	17
<i>Bob Fincken, Super Systems, Inc., Cincinnati, OH, USA</i>	

Brazing

Transient Liquid Phase Diffusion Bonding of Stainless Steel 304 Using Copper and Aluminium Filler Interlayers	20
<i>M. Mazar Atabaki^{1, 2}, J. Noor Wati², and J. Bte Idris¹</i>	
<i>(1) University of Leeds, Leeds, UK</i>	
<i>(2) Universiti Teknologi Malaysia, Malaysia</i>	

Cryogenic Processing

The Effect of Cryogenic Processing on the Mechanical Properties of Austempered Ductile Cast Iron (ADI)	44
<i>Susil K. Putatunda¹, Codrick Martis¹, Frederick Diekman², and Rozalia Papp³</i>	
<i>(1) Wayne State University, Detroit, MI, USA</i>	
<i>(2) Controlled Thermal Processing Inc., Park City, IL, USA</i>	
<i>(3) Air Liquide US LP, Countryside, IL, USA</i>	

Emerging Technologies

Microstructural Characterization and Creep Properties of Cast Nb, Zr-Modified HP Steels	50
<i>Fernando B. Martins¹, Marcelo Martins², George E. Totten³, Frederico A.P. Fernandes⁴, and Luiz C. Casteletti⁴</i>	
<i>(1) Federal University of São Carlos (UFSCar), São Paulo, Brazil</i>	
<i>(2) Sulzer Brasil S/A, Americana, São Paulo, Brazil</i>	
<i>(3) Portland State University, Portland, OR, USA</i>	
<i>(4) São Carlos School of Engineering (USP), São Paulo, Brazil</i>	

Quantum Jump in Heat Treating	55
<i>Shobhan Paul, Starfire Technologies LLC, Malibu, CA, USA</i>	

Method for Accurate Surface Temperature Measurements during Fast Induction Heating ...	60
<i>Benjamin Larregain¹, Nicolas Vanderesse¹, Florent Bridier¹, Philippe Bocher¹, and Patrick Arkinson²</i>	
<i>(1) École de Technologie Supérieure, Montreal, Quebec, Canada</i>	
<i>(2) Pratt & Whitney Canada, Longueuil, Quebec, Canada</i>	

Equipment Design

The Aerodynamic Furnaces for Heat Treatment	68
<i>Alexey Sverdin¹, Matthew A. Panhans¹, Yury Sokolov², and Arnold Ness³</i>	
<i>(1) Milwaukee School of Engineering, Milwaukee, WI, USA</i>	
<i>(2) Rzhev, Russia</i>	
<i>(3) Bradley University, Peoria, IL, USA</i>	

Operational Efficiency Improvements Resulting from Monitoring and Trim of Industrial Combustion Systems	76
<i>Damian Bratcher, Super Systems, Inc., Cincinnati, OH, USA</i>	

Evolution of Microstructures

Automatic Vickers Case Depth Measurement	81
<i>Arnold Horsch, AHOTEC® e.K., Remscheid, Germany</i>	

New Heat Treatment Temperatures for HR-120™ Alloy	86
<i>Octavio Covarrubia^{1, 2} and Rafael Colas²</i>	
<i>(1) Frisa Forjados SA de CV, Santa Catarina, NL, Mexico</i>	
<i>(2) Universidad Autonoma de Nuevo Leon, San Nicolas, NL, Mexico</i>	

Gear Heat Treatment

Intelligent Heat Treating: Simulation of Carburization Process	91
<i>Y. Wei¹, G. Wang¹, R.D. Sisson, Jr.¹, B. Bernard², and R. Poor²</i>	
<i>(1) Worcester Polytechnic Institute, Worcester, MA, USA</i>	
<i>(2) Surface Combustion, Inc. Maumee, OH, USA</i>	

Austempered Materials for Powertrain Applications	99
<i>Justin Lefevre and Kathy L. Hayrynen</i>	
<i>Applied Process Technologies Division, Livonia, MI USA</i>	

Integral Preoxidation of Aerospace Gear Steel	108
<i>Timothy De Hennis¹, Dale Weires¹, and Tyler Pounds²</i>	
<i>(1) The Boeing Company, Philadelphia, PA, USA</i>	
<i>(2) Northstar Aerospace (Chicago) Inc., Bedford Park, IL, USA</i>	

New Carbonitriding Processes	115
<i>Franz T. Hoffmann, Matthias Steinbacher, P.D. Brigitte Clausen, Sebastian Bischoff,</i>	
<i>Heinrich Klümper-Westkamp, and Hans-Werner Zoch,</i>	
<i>Stiftung Institut für Werkstofftechnik (IWT), Bremen, Germany</i>	

Global Issues

Detailed Specifications for Global Heat Treatment Sourcing and Materials 122

Jared Sponzilli¹ and John Sponzilli²

(1) Navistar, Inc., Melrose Park, IL, USA

(2) Warrenville, IL, USA

Quality Improvement in Heat Treatment Based on Necessary Information Exchange 131

Volker Ermert¹, Arnold Horsch², Dieter Klein³, Thorsten Wuest³, Rainer Kohlmann⁴,

Ralph Mahlig⁵, and Britta Rentrop⁶

(1) Wolf Behälter- und Apparatebau GmbH & Co. KG, Wilnsdorf, Germany

(2) AHOTEC e.K., Remscheid, Germany

(3) BIBA - Bremer Institut für Produktion und Logistik GmbH, Bremen, Germany

(4) Werkstoffberater, Siegen, Germany

(5) VHK Vakuum-Härtereier Köllner GmbH, Schmerbach, Germany

(6) Glüh- und Härtetechnik Unna GmbH & Co KG, Unna, Germany

Heat Treat Manufacturing Advances

Cleaning for Heat Treating 138

D. Scott MacKenzie and Robert Johnston, Houghton International, Inc., Valley Forge PA, USA

Bottleneck Oriented Load Planning in Heat Treatment – Optimizing the Production Flow Saves on Time and Resources 144

Karl-Michael Winter, Process-Electronic GmbH, Heiningen, Germany

Adoption of Automation and Process Control in a Job Shop 148

Tom Benoit, The Flame Treating and Engineering Company, West Hartford, CT, USA

Induction Heating

Cost-Effective Technology for Induction Contour Hardening of Bevel, Hypoid and Pinion Gears 151

Semyon Brayman¹, Anatloy Kuznetsov¹, Sergey Nikitin¹, Bob Binoniemi¹, and Valery Rudnev²

(1) ERS Engineering Corp., West Bloomfield, MI, USA

(2) Inductoheat Inc., Madison Heights, MI, USA

Unique Computer Modeling Approaches for Simulation of Induction Heating and Heat Treating Processes 158

Valery Rudnev, Inductoheat Inc., Madison Heights, MI, USA

Data Acquisition for Numerical Modelling of Induction Surface Hardening – Process Specific Considerations 167

Maximilian Schwenk, Jürgen Hoffmeister, and Volker Schulze,

Karlsruher Institute of Technology (KIT), Karlsruhe, Germany

Recent Inventions and Innovations in Induction Hardening of Gears and Gear-Like Components 177

Valery Rudnev, Inductoheat Inc., Madison Heights, MI, USA

Stress and Distortion Evolution during Induction Case Hardening of Tube	182
<i>Valentin Nemkov¹, Robert Goldstein¹, John Jackowski¹, Lynn Ferguson², and Zhichao Li²</i>	
<i>(1) Fluxtrol, Inc., Auburn Hills, MI, USA</i>	
<i>(2) Deformation Control Technology, Inc., Cleveland, OH, USA</i>	

Light Alloys

Dissolution of Second Phase Particles in 319-Type Aluminum Alloy	189
<i>Leo J. Colley¹, Mary A. Wells², Robert MacKay³, and Wojciech Kasprzak⁴</i>	
<i>(1) University of British Columbia, Vancouver, BC, Canada</i>	
<i>(2) University of Waterloo, Waterloo, ON, Canada</i>	
<i>(3) NEMAK Engineering Centre, Windsor, ON, Canada</i>	
<i>(4) CANMET Materials Technology Laboratory, Hamilton, ON, Canada</i>	

Properties of Semi-Finished Products and Welded Joints of Aluminum Alloy V92Zr after Prolonged Low-Temperature Heating	199
<i>Alexey Sverdlin and Matthew Panhans, Milwaukee School of Engineering, Milwaukee, WI, USA</i>	

Heat Treatment of Development for Rapidly Solidified Heat Resistant Cast Al-Si Alloy	205
<i>W. Kasprzak¹, D.L. Chen², and E. Thibodeau³</i>	
<i>(1) CANMET Materials Technology Laboratory, Hamilton, Ontario, Canada</i>	
<i>(2) Ryerson University, Toronto, Ontario, Canada</i>	
<i>(3) McGill University, Montréal, Quebec, Canada</i>	

Microstructures

Effect of Heat Treatment on Fracture Toughness of Micro-Alloyed Steel	212
<i>Joydeb Nag Chaudhuri¹ and R.C. Prasad²</i>	
<i>(1) University of Mumbai, Mumbai, India</i>	
<i>(2) Indian Institute of Technology Bombay, Mumbai, India</i>	

Nitriding, Carbonitriding, and Nitrocarburizing

The Influence of Nitrocarburizing on Wear Behaviour of Forging Dies	226
<i>J.B. Mane¹, R.C. Prasad², and B. Radhakrishnan¹</i>	
<i>(1) Bharat Forge Ltd., Pune, Maharashtra, India</i>	
<i>(2) Indian Institute of Technology Bombay, Bombay, Maharashtra, India</i>	

Quenching and Control of Residual Stresses

Heat Transfer Properties of a Series of Oxidized and Unoxidized Vegetable Oils in Comparison with Petroleum Oil-Based Quenchants	235
<i>Ester Carvalho de Souza¹, Loralice C.F. Canale¹, G. Sánchez Sarmiento², Eliana Agalio³, Juan C. Carrara⁴, Diego S. Schicchi⁴, and George E. Totten⁵</i>	
<i>(1) Universidade de São Paulo, São Carlos, SP, Brazil</i>	
<i>(2) Universidad del Salvador, Buenos Aires, Argentina</i>	
<i>(3) Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina</i>	
<i>(4) Universidad Tecnológica Nacional, Buenos Aires, Argentina</i>	
<i>(5) Texas A&M University, Seattle, WA, USA</i>	

Simulation of Stress and Strain for Induction Hardening Applications	244
<i>Dmitry Ivanov, Leif Markegård, and John Inge Asperheim, EFD Induction a.s., Skien, Norway</i>	

Distortion Control of Transmission Components by Optimized High Pressure Gas Quenching	253
---	-----

Volker Heuer¹, Donald R. Faron², David Bolton³, Mike Lifshits³, and Klaus Loeser¹

(1) ALD, Hanau, Germany

(2) General Motors, Pontiac, MI, USA

(3) ALD Thermal Treatment, Port Huron, MI, USA

Effect of the Oxidation Stability of Soybean Oil and Palm Oil on Steel Quenching Performance	258
---	-----

Diego Said¹, Gabriela Belinato², Rosa L. Simencio Otero², Lauralice C.F. Canale²,

Gustavo S. Sarmiento³, Analía Gastón³, and George E. Totten⁴

(1) Universidad Tecnológica Nacional, Buenos Aires, Argentina

(2) Universidade de São Paulo, São Carlos, SP, Brazil

(3) Universidad Nacional de Rosario, Rosario, Argentina

(4) Portland State University, Portland, OR, USA

Epoxidized Soybean Oil: Evaluation of Oxidative Stabilization and Metal Quenching/Heat Transfer Performance	266
--	-----

Rosa L. Simencio Otero¹, Lauralice C.F. Canale¹, Diego Said Schicchi², Eliana Agalotis³, George E. Totten⁴, and Gustavo Sánchez Sarmiento⁵

(1) Universidade de São Paulo, São Carlos, SP, Brazil

(2) Universidad Tecnológica Nacional, Buenos Aires, Argentina

(3) Consejo Nacional de Investigaciones Científicas y Técnicas, Buenos Aires, Argentina

(4) Texas A&M University, Seattle, WA, USA

(5) Universidad del Salvador, Buenos Aires, Argentina

Effect of Bath Temperature on Surface Heat Flux during Quenching in CNT Nanofluids	277
---	-----

K. Babu¹ and T.S. Prasanna Kumar²

(1) SSN College of Engineering, Kalavakkam, Chennai, India

(2) IIT Madras, Chennai, India

Surface Hardening

Development of Low-Cost, Rapid Case Hardening Treatments for Austenitic Stainless Steels	285
---	-----

Xiaolan Wang¹, Zbigniew Zurecki², and Richard D. Sisson, Jr.¹

(1) Worcester Polytechnic Institute, Worcester, MA, USA

(2) Air Products & Chemicals, Inc., Allentown, PA, USA

Effect of Process Time on Low-Temperature Nitrided Austenitic Stainless Steels Layer Structure	295
---	-----

D. Koshel and J. Kalucki, Nitrex Metal Inc., St. Laurent, QC, Canada

William R. Jones Honorary Symposium on Vacuum Technology

The Vacuum Heat Treatment of Titanium Alloys for Commercial Airframes	301
--	-----

Robert Hill, Solar Atmospheres, USA

The Evolution of High “Tech” Vacuum Furnaces	303
<i>Robert M. Huckins, G-M Enterprises, Corona, CA, USA</i>	
Energy Efficient Vacuum Solutions for Industrial Furnaces	305
<i>Uwe Zöllig and Mario Vitale, Oerlikon Leybold Vacuum, Cologne, Germany</i>	
Multi-Purpose LPC+LPN+HPGQ 25 Bar N₂/He Single Chamber Vacuum Furnaces	309
<i>Maciej Korecki¹, Józef Olejnik¹, Piotr Kula², Robert Pietrasik², and Emilia Stańczyk-Wołowicz²</i>	
<i>(1) Seco/Warwick S.A., Świebodzin, Poland</i>	
<i>(2) Technical University of Lodz, Poland</i>	