

Table of Contents

Preface

Microstructural Identification and Control of Very Low Carbon Modern High Strength Low Alloy Steels	
T. Araki, M. Enomoto and K. Shibata	3
Thermal Cycling in the Austenite Temperature Region for Grain Size Control in Steels	
S.J. Mikalac, A.V. Brandemarte, L.M. Brown, M.G. Vassilaros and M.E. Natishan	11
The Heat Treatment of P/M Tool Steels	
A. Kulmburg and B. Hribernik	31
Surface Chemical Properties of Heat-Treated Industrial Steel	
S.K.E. Forghany	43
Heat Resistant Alloy Performance in the Heat Treatment Industry	
J.C. Kelly	53
Commercial Heat Treatment to 2000 AD	
T.L. Elliott	63
Towards the Optimization of Heat-Treatment in Aluminium Alloys	
C.W. Meyers, K.H. Hinton and J. Chou	75
Hardness, Melting Reactions and Heat Treatment of Al-Si-Cu-Mg Alloys Reinforced with Aluminiumoxide Particles	
M.J. Starink, V. Jooris and P. Van Mourik	85
Advances in the Heat Treatment of 7000 Type Aluminium Alloys by Retrogression and Reaging	
B. Cina and F. Zeidess	99
Effect of High Temperature Treatment on the Structure and Mechanical Properties of Aluminium Foundry Alloys	
V.S. Zolotarevsky, N.A. Belov, A.A. Axenov and D. Goutam	109
Heat Treatment and Phase Inter-Relationships of the Spray Cast Cu-15 wt%Ni-8 wt%Sn Alloy	
E.W.J. van Hunnik, J. Colijn and J.A.F.M. Schade van Westrum	115
Influence of Heat Treatment on the Microstructural and Chemical Evolution of Au₈₀Sn₂₀ Alloys for Welding Applications	
	125
Gas Flow Regulation in a Carburizing Heat Treatment of Steels	
P. Casadesus and M. Gantois	149
Plasma Overcarburizing of Chromium Steels for Hot Working and Wear Applications	
J.P. Souchard, P. Jacquot and M. Buvron	155
Influence of the Base Material Hardenability on Effective Case Depth and Core Hardness	
B. Vandewiele	169
Bending Fatigue and Microstructure of Gas-Carburized Alloy Steels	
K.A. Erven, D.K. Matlock and G. Krauss	183
Influence of Surface Microstructure on Bending Fatigue Strength of Carburized Steels	
A. Melander and S. Preston	199
Case Hardening in the Next Century	
F. Kühn and B. Lineberg	211
Model Description of Iron-Carbonitride Compound-Layer Formation during Gaseous and Salt-Bath Nitrocarburizing	
M.A.J. Somers and E.J. Mittemeijer	223
Control of the Compound-Layer Structure in Gaseous Nitrocarburising	
L. Sproge and J. Slycke	229
Kinetics of Compound-Layer Growth during Nitrocarburizing	
H. Du and J. Ägren	243
Nitriding of Sintered Steels and Nitrocarburizing of Steels in Fluidized Bed Furnace	
F. Cavalleri, G.F. Tosi and P.L. Cavallotti	249
The Structure and Properties of Ion Nitrided 410 Stainless	
M.F. Danke and F.J. Worzala	259

A Fracture Mechanics Approach to Toughness Characterization of Nitrided Layers R. Roberti, G.M. La Vecchia and G. Colombo	271
Influence of Thermochemical Treatment on Corrosion Resistance of Steels J. Straus and D. Hitczenko	279
Modified Process Parameters in Nitrocarburizing Improve Component Properties and Give Greater Economy G. Wahl	285
Plasma Nitriding and Plasma Carburizing of Pure Titanium and Ti6Al4V Alloy P. Jacquot, M. Buvron and J.P. Souchard	301
The Influence of Tempering and Surface Conditions on the Fatigue Behaviour of Surface Induction Hardened Parts P.K. Braisch	319
Induction Heat Treatment of Case Hardening Steels P. Archambault, M. Pierronnet, F. Moreaux and Y. Pourprix	335
Selective Surface Treatment of Gears by Induction Profile Hardening G.D. Pfaffmann	345
Induction Hardening of Cast Iron Cylinder Head Valve Seats C.C. Lal	365
TFX An Induction Heating Process for the Ultra Rapid Heat Treatment of Metal Strip R.C. Gibson, W.B.R. Moore and R.A. Walker	373
Production and Concentration of Magnetic Flux for Eddy Current Heating Applications R.S. Ruffini and R.J. Madeira	383
Reduction of the Tensile Stress State in Laser Treated Materials J.T.M. de Hosson, J. Noordhuis and B.A. van Brussel	393
Laser Surface Nitriding of Titanium and a Titanium Alloy V.M. Weerasinghe, D.R.F. West and M. Czajlik	401
Fatigue Properties and Residual Stresses in Laser Hardened Steels R. Lin and T. Ericsson	409
Coupled Growth in Eutectic Systems S.M. Copley, E.Y. Yankov, J.A. Todd and M.I. Yankova	417
CO₂ Laser Subcritical Annealing of 2Cr-1Mo Steel Laser Welded Joint W. Cerri, G.P. Mor, M. Balbi and T. Zavanella	433
Creating Tailor-Made Surfaces with High Power CO₂-Lasers C.F. Magnusson, G. Wiklund, E. Vuorinen, E. Engström and T.F. Pedersen	443
Electron Beam Surface Modification State of the Art (Review) R. Zenker	459
Electron Beam Mixing in Copper-Aluminium Surface Layers D.G. Rickerby	477
Surface Modification of Materials Produced by Dynamic Ion Mixing J.P. Rivière and J. Delafond	485
Surface Characterization and Tribological Improvements of Ti or (Ti+C) Implanted AISi M2 Steel M.A. El Khakani, G. Marest, N. Moncoffre, J. Tousset and M. Robelet	495
Ion Implantation for Biomaterials J. Rieu, A. Pichat, L.M. Rabbe and M. Robelet	505
Controlled Shot Peening Today C.P. Diepart	517
Chemically Vapour Deposited Alumina Coatings on High Speed Steel Cutting Tools A.B. Smith and Z. Naeem	533
Characteristics of Chromium Carbide Layers Produced on Martensitic Stainless Steel Using Different Chemical Vapour Deposition (CVD) Techniques B. Eastwood, S. Harmer, J. Smith and A. Kempster	543
Multicomponent Hard Coatings for WC-Co Sintered Carbides B. Formanek, L. Swadźba, A. Maciejny and D. Rozlach	553
Plasma Characteristics Related to Thin-Film Microstructures in Unbalanced Magnetron Sputtering Processes S.L. Rohde	563

Possibilities of Suppression of Droplets in Arc Evaporation Process J. Vyskocil	573
Further Developments of the Multiple-Mode Ionised Vapour Source System P. Robinson and A. Matthews	581
Deposition of Ti(C,N) Coatings by Arc Evaporation O. Knotek, H.-. Prengel and J. Brand	591
The Development of (Ti,Al)N and (Ti,Nb)N Ceramic Coatings Produced by Steered Arc Ion-Plating J.P. Celis, J.R. Roos, E. Vancoille, S. Boelens and J. Ebberink	599
Tribological Performance of Plasma Treated and Coated Surfaces A. Leyland, P.R. Stevenson and A. Matthews	615
Performance of TiN-, Ti(C,N)- and (Ti,Al)N-Coated Cutting Tools W. König and D. Kammermeier	623
Deposition of Stabilised Zirconia onto Metallic Substrates Using a DC Thermionic Triode Ion Plating Technique A.S. James and A. Matthews	633
A Comparison of Techniques for Producing Diamond-Like Carbon Coatings P. Holiday, A. Matthews and A. Dehbi-Alaoui	643
Combined Plasma Nitriding/PVD Processes M. Zlatanović and T. Gredic	655
Diffusion Treatment of Surface Coatings by Hot Isostatic Pressing H.-. Steffens, J. Lebküchner-Neugebauer and M. Dvorak	667
Depositions of Welded Coatings to Improve Hot Wear and Thermal Fatigue Resistance of Hot Die Steel P. Gimondo, B. Grifoni and F. Sintoni	679
A Study of the Adherence and Cracking by Deformation in a Multilayer Metallic Coating of Plain Carbon Steels L. Sanchez, F. Gutiérrez-Solana, J.J. Gonzalez and J.A. Alvarez	689
A Study of a Laser Irradiated Molybdenum Plasma Sprayed Coating on Steel A. Koutsomichalis, H. Badekas and C. Panagopoulos	699
Plasma-Spray Coatings on Carbon-Epoxy Substrates F. Alonso, I. Fagoaga and P. Oregui	709
Microstructure and Resistance to Cracking of Modified Protective Diffusion Coatings on Nickel-Base Superalloys L. Swadźba, B. Formanek, A. Maciejny and J. Biedron	721
The Use of Analysis in Surface Treatments B.A. Bellamy	729
Reliable Hardness Testing with a Fast Ultrasonic Method (UCI) E. Schenuit	733
Martens Hardening of Steel - Prediction of Temperature Distribution and Surface Hardness H.M. Tensi and A. Stick	741
Computerized Process Planning in Heat Treating Practice Using Personal Computers T. Réti and M. Gergely	755
Calculation of Distortion during Quenching of a Low Carbon Steel A. Thuvander and A. Melander	767
Computer Aided Simulation of the Temperature and the Distortion of Components during Heating Up in Heat-Treatment Furnaces R. Arola, H. Martikainen and J. Virta	783
Mathematical Modelling of the Heat Treatments (Quenching and Tempering) of a Cr-Mo-B-V, High Strength Low Alloy Steel M. Isac, D. Pascota and S. Ciuca	791
Integrated Computer Control of Induction Hardening N. Kanetake	799
Computer-Aided Optimization of Heat-Treatment Processes for the Automobile Industry F. Kühn	809
A New Generation of Process Computers for the Heat-Treatment Processes W. Stein	821

Oxygen Sensors - A Review of Their Impact on the Heat Treating Industry H.W. Bond	831
Electronic Flow Meter and Valve Integration with Computer Controlled Process Equipment J.E. Powalisz	839
Progress in Vacuum- and Plasma-Technology B. Edenhofer, F. Bless and W. Peter	849
Universal Vacuum Hardening Plant Application and Results H. Altena	859
Gas Quenching with Helium in Vacuum Furnaces B. Lhote and O. Delcourt	867
Multiflow Pressure Quenching in Vacuum Furnaces A. Kay	885
Trends and Developments in Vacuum Furnace Technology D. Pye	897