

Table of Contents

Committees

Keynote

An Overview on Cast Iron Research at CMRDI

A. Nofal 3

The Mechanism of Formation of Casting Skin in CG Iron and its Effect on Tensile Properties

S. Boonmee and D.M. Ștefănescu 11

Part I: Graphite Nucleation and Morphology

Role of Lanthanum in Graphite Nucleation in Grey Cast Iron

I. Riposan, M. Chisamera, S. Stan, E. Stefan and C. Hartung 19

Influence of Ti on Graphite Morphological Transition in Flake Graphite Cast Iron

H. Nakae and K. Fujimoto 25

Graphite Morphology Evolution during Melt Holding of Ductile Iron

X.G. Diao, Z.L. Ning, F.Y. Cao, S.Z. Ren and J.F. Sun 31

Influence of Melting Conditions on Graphite Morphology in Spheroidal Graphite Cast Iron Using Ni-C Alloys

Y. Kato, Y. Zou and H. Nakae 37

Oxygen State Forms in Cast Iron and their Effect on Graphite Crystallization

E.B. Ten 43

On the Theories of Graphite Formation in Iron

V.L. Naydek, V.P. Gavriluk and I.G. Neizhko 48

Microstructure Investigation of Small-Section Nodular Iron Castings with Chunky Graphite

I. Asenjo, J. Lacaze, P. Larrañaga, S. Méndez, J. Sertucha and R. Suárez 52

Part II: Solidification and Structure Formation of Cast Iron

Influence of Primary Austenite on the Nucleation of Eutectic Cells

L. Elmquist, A. Diószegi and P. Svidró 61

Growth of Eutectic Austenite in Free Graphite Cast Irons

G.L. Rivera, R.E. Boeri and J.A. Sikora 67

Effect of Yttrium-Containing Nodulizer on the Microstructure Formation and Mechanical Properties of Heavy Section Ductile Iron Castings

Q.X. Ren, M. You, Y.B. Yao, G.M. Wen and Q.Z. Cai 73

Microstructure and Properties of Cast Iron with Semi-Solid Process Using Cooling Plate Technique

M. Takita 79

The Effect of Semi-Solid Parameters on the Microstructure and Hardness of High Chromium Cast Irons

A. Inanlou, S.H. Seyedein and M.R. Aboutalebi 84

Effects of Iron Powder Addition on the Solidification Behaviour of Hypereutectic Grey Cast Iron

M. Chisamera, I. Riposan, S. Stan, I. Anton and M. Barstow 90

Influence of Iron Powder Addition on the Structure Characteristics of Hypereutectic Grey Cast Iron

M. Chisamera, I. Riposan, S. Stan, C. Militaru and M. Barstow 96

The Effect of Vanadium and Chromium on the Precipitation of Carbide in Si-Mo Ferritic Ductile Cast Iron

K.H. Choe, K.M. Lim, S.M. Lee and K.W. Lee 102

Solidification Study of Gray Cast Iron in a Resistance Furnace R. Lora, A. Diószegi and L. Elmquist	108
The Effect of Nitrogen and Inoculation on the Tensile Properties and Microstructure of Cast Iron with Lamellar Graphite F. Wilberfors and I.L. Svensson	114
New Aspects Regarding the Structure of Spheroidal Cast Iron Carbon Inclusions Revealed by WAXD Investigations I. Pencea, D.M. Ștefănescu, R. Ruxanda and F.V. Anghelina	120
The Influence of Alloying Elements on Chill Formation in CGI M. König, I.L. Svensson and M. Wessen	126
Development of Hypereutectoid Steel with Nodular Graphite D.S. Kozak	132
Mechanism of Dissolved Sulfur Influence on the Transition from Graphite to Cementite Eutectic in Cast Iron E. Fraś and M. Górny	137

Part III: Solid-State Transformation in Cast Iron

Characteristics of the Transformations Occurring within the Intercritical Interval of Ductile Iron A.D. Basso, R. Martinez and J.A. Sikora	145
Pearlite Stabilisation by Copper on Ductile Cast Iron M. Tsujikawa, N. Matsumoto, K. Nakamoto and Y. Michiura	151
Study of the Eutectoid Transformation in Grey Cast Irons and its Effect on Mechanical Properties T. Sjögren and H. Svensson	157
Influence of Cooling Rate and Alloying Elements on Kinetics of Eutectoid Transformation in Spheroidal Graphite Cast Iron P. Mrvar, M. Petrič and J. Medved	163
The Effect of Cooling Rate, Section Size and Alloying on Matrix Structure Formation in Pearlitic Grey Cast Iron H. Svensson and T. Sjögren	169
Influence of Alloying Elements on the Bainitic Transformation of Ductile Iron B. Karbakhsh Ravari and M. Nili Ahmadabadi	175
Notch Fatigue and Fracture Mechanics of Austempered Ductile Irons B. Atzori, F. Bonollo and G. Meneghetti	181
Advances in the Development of Carbide ADI L. Sebastián, J.A. Sikora and R.C. Dommarco	187
The Effect of Partial Melting Homogenization on the Mechanical Properties of Thick Section Austempered Ductile Iron Containing 2% Mn A. Sheikholeslam, M. Nili-Ahmadabadi and J. Rassizadehghani	193
Thermo-Mechanically Processed Multi-Phase Ductile Iron: Microstructure Development M. Soliman, H. Palkowski and A. Nofal	199

Part IV: White and Alloyed Cast Irons

Microstructure and Properties of Isothermally Quenched High Boron White Cast Iron J.J. Zhang, Y.M. Gao, J.D. Xing, S.Q. Ma, W.Q. Yan and J.B. Yan	207
Effect of Rare Earth-Al Additions on the Structural Variations of Medium Carbon Fe-B Cast Alloy D.W. Yi, J.D. Xing, H.G. Fu, S.Q. Ma and Z.X. Liu	213
Influence of Boron Concentration on the Corrosion Resistance of High Boron White Cast Iron to Liquid Zinc Bath S.Q. Ma, J.D. Xing, D.W. Yi, J.J. Zhang, S.C. Ma and G.F. Liu	219
Effects of Forging and Heat Treatment on Microstructure and Properties of High Boron White Cast Iron J.J. Zhang, Y.M. Gao, J.D. Xing, S.Q. Ma, Y.F. Li and L. Liu	225

Structural Refinement of 15%Cr-2%Mo White Irons A. Nofal, R. Reda, K.M. Ibrahim and A. Hussein	231
Effect of Chromium and Vanadium Contents on Continuous Cooling Transformation Behavior of Multi-Component White Cast Iron Y. Yokomizo, K. Yamamoto, N. Sasaguri and Y. Matsubara	237
Abrasion Behavior of High Cr-V-Nb Cast Iron M. Hirose, K. Yamamoto, H. Miyahara, K. Sakata and K. Ogi	243
Wear Characteristics of Spheroidal Carbides Cast Irons in Uniaxial Rotary Glass Shredder N. Yoneta, K. Shimizu, H. Hara, M. Tanaka and Y. Nawa	249
High Temperature Erosion Behaviors of High V-Cr-Ni Spheroidal Carbides Cast Iron K. Shimizu, T. Naruse, Y. Xinba, H. Teramachi, S. Araya and M. Ishida	255
Study of Feeding Parameters for the Production of Sound High-Alloyed Ductile Iron Castings with Aluminum V.D. Belov, E.B. Ten and A.S. Drokin	261
New Wear-Resistant Metastable Strain Hardenable Alloyed Cast Irons O.P. Cheiliakh and I.V. Kolodyazhna	267
Interface Property and Two-Body Wear Behavior of High-Cr WCI Matrix Composite Reinforced with CC Particles Y.F. Li, Y.M. Gao, J.J. Zhang and J.B. Yan	273
Fatigue Characteristic of Spheroidal Vanadium Carbides Cast Iron M. Tanaka, K. Shimizu, D. Ito and T. Noguchi	279

Part V: Computational Modeling of Cast Iron Transform

The Role of Alloy Design in Semi-Solid Casting of Ductile Iron Processed by Inclined Cooling Plate B. Heidarian, M. Nili-Ahmadabadi and M. Moradi	287
Prediction of Hypoeutectic Gray Iron Microstructure during Solidification and Solid Transformation Using Simple Fourier Model M.A. Taha, N.A. El Mahallawy, A.M. El-Sabbagh, T. El-Benawy and H.F. Hadla	293
Computer Simulation of Lost Foam Process of Cast Iron I. Ohnaka, A. Sugiyama, K. Konishi, Y. Obana, J.D. Zhu and N. Sako	299
Study on Data Base of Modeling Concerning Casting Phenomena in Cast-Iron-Mould Simulation Systems Z. Ignaszak	305
Researches about the Determination of the Thermal Conductivity Coefficient for Silica Sand Moulds Used in Romanian Foundries I. Ciobanu, M. Chisamera, S.I. Munteanu, A. Crişan, I. Riposan, T. Bedő and C.I. Lupinca	312
Modelling the Thermal Conductivity of Various Cast Irons D. Holmgren	318
Modeling of the Divorced Eutectic Solidification of Spheroidal Graphite Cast Iron H.L. Zhao, M.F. Zhu and D.M. Ştefănescu	324
Simulation of the Ductile Iron Solidification Using a Cellular Automaton A.A. Burbelko, E. Fraś, D. Gurgul, W. Kapturkiewicz and J.A. Sikora	330
Using Regression Analysis to Optimize the Combination of Thermal Conductivity and Hardness in Compacted Graphite Iron M. Selin	337
Development of Ductile Iron Material, Simulation and Production Technology to Locally Strengthen Castings W. Menk, S. Tunzini, T. Rieck, C. Honsel and K. Weiss	343
Prediction of Microstructure and Porosity Formation of Practical Spheroidal Graphite Iron Castings H.D. Zhao and B.C. Liu	349

Part VI: Quality and Properties

Some Key Points on High Strength Grey Iron Cylinder Block Production F.J. Li, A.K. Cai, D.X. Tang, F.Z. Ren and H.L. Dong	357
Effect of Selected Alloying Elements on Mechanical Properties of Pearlitic Nodular Cast Irons J. Serrallach, J. Lacaze, J. Sertucha, R. Suárez and A. Monzón	361
Plate Fracture of Nodular Cast Iron C.J. Heckmann, W. Stets and G. Wolf	367
Lubricated Friction and Wear Properties of P-B Bearing Flaky Graphite Cast Iron T. Itoh and K. Ogi	374
Mechanical Properties and Thermal Expansion Characteristics of Low Thermal Expansion Ductile Cast Iron with same Nickel Equivalent (NiE) M. Hatate, T. Nobuki, S. Kiguchi and K. Shimizu	380
Effect of Copper Addition on Mechanical Properties of Nodular Indefinite Chilled Iron (NICI) Y. Prasetyo, S.K. Lee and E.R. Baek	386
Notch Effects on Impact and Bending Characteristics of Spheroidal Graphite and Compacted Vermicular Graphite Cast Irons with Various Matrices T. Nobuki, M. Hatate and T. Shiota	392
Effects of Graphite Shape on Thermal Fatigue Property of Thin Wall Graphitic Cast Irons Y.N. Pan, C.C. Fan and C.H. Chang	398
Bending Strength of Cast Materials Reinforced with Hard Particles S. Aso, H. Ike, K. Ohguchi, Y. Komastu and N. Konishi	404
Literature Survey on Porosity and Microporosity in Cast Irons Related to Expansion and Gas Entrapment Phenomena V. Anjos, C.A. Silva Ribeiro, F. Dias, W. Baumgart and J. Cunha	410
On the Formation of Shrinkage Porosity in Gray Iron Castings L. Elmquist, A. Diószegi and T. Björklind	416
Surface Turbulence at Flow of Gray Cast Iron A. Diószegi, T. Björklind and Z. Diószegi	422
Suppression of Elevated Temperature Brittleness in Spheroidal Graphite Cast Iron by Increasing Phosphorus Content Y. Iwabuchi and I. Kobayashi	428

Part VII: Processing and Applications

Selection of Cast Iron Grade for Stub-Anode Fixation in Aluminum Electrolytic Cells A. Nofal, M. Waly, A. Ahmed and M. Agour	435
Wear Property of Ductile Iron Locally Reinforced with Cr-Containing Steel Inserts C. Mayerling Martinez, N. Valle, J. Lacaze, I. Thorbjornsson, B. Johannesson, J.T. Thorgrimsson, B. Podgornik and J. Vízintin	441
New Application of High Niobium Cast Iron as a Grain Refiner for Stainless Steels H. Sakaki, M. Mizumoto, T. Ohgai and A. Kagawa	447
Optimum Pressure Control of Molten Metals for Casting Production Using a Novel Greensand Mold Press Casting Method K. Terashima, R. Tasaki, Y. Noda, K. Hashimoto, J. Iwasaki and T. Atsumi	453
Technology and Effectiveness of Cast Iron Treatment by Gas Injection E.B. Ten	459
Fundamentally New Effective Process of Casting of Hollow Cylindrical Billets of Cast Iron by the Method of Directional Solidification Y. Ignatievich Marukovich and U. Fiodaravich Beuza	465
Analysing the Deformation Behaviour of Compacted Graphite Cast Irons Using Digital Image Correlation Techniques T. Sjögren, P.E. Persson and P. Vomacka	470
Mg7-FeSi Alloy Dissolution Kinetics in the In-Mould Process V.B. Bublikov, Y.D. Bachinskyi, D.N. Berchuk, A.A. Yasinskyi and E.P. Nesteruk	476
Magnetodynamic Mixer-Batcher for Overheating and Pouring of Cast Iron V.I. Dubodelov, V.K. Pogorsky and M.S. Goryuk	481

Improvement of the Metallurgical Quality of Ductile Iron by Conditioning E. Ochoa de Zabalegui, J. Arriaran, J.C. Bicandi and D. Ferrer	487
Effect of Austempering Temperature on High Cycle Fatigue Behavior of an Austempered Ductile Iron (ADI) S. Yazdani, A. Sadighzadeh Benam and B. Avishan	493
A Study on Ductile Iron Production without the Use of Feeders V. Fourlakidis	499