# Table of Contents

## Hoyt Memorial Lecture

04-083  The Absence of Perfection—G.M. Goodrich, Professional Metallurgical Services, Buchanan, MI

## ENGINEERING, Div. 1

04-016  Assessing Mold Tooling Life—T.J. Schorn, Enkei America, Inc, Columbus, IN


04-036  Cost Effective Planning and Maintaining of Production Tooling—N. Fox, Galesburg Castings, Inc, Galesburg, IL

04-044  Modeling of Temperature Measurement Process With a Thermocouple: A Comprehensive Parametric Study and Some Experimental Results—X. Xue, R. Luck, B. Dawsey, J.T. Berry, Mississippi State Univ, Starkville, MS


04-067  Quality Inventory Tooling Management—P. Cunliffe, G&W Electric Co, Blue Island, IL

04-078  Development of a Heat Transfer Coefficient Evaluator—P. Krishna, K.T. Bilkey, S.W. Hao, R.D. Pehlke, Univ of Michigan, Ann Arbor, MI


04-105  Generation of Structured Body-Fitted Meshes for Complex-Shaped Castings—F. Mampaey, WTCM Materials Processing, Zwijnaarde, Belgium


04-138  Using Statistical Tools to Detect and Improve Core Shift: A Case Study—P.L. Barker Jr, Dalton Corp, Warsaw, IN; B. Bidassie, Statistician, Kalamazoo, MI
ALUMINUM, Div. 2

04-007 Effect of Iron and Cooling Rate on Tensile Properties of B319.2 Alloys in Non-Modified and Sr-Modified Conditions—Z. Ma, A.M. Samuel, F.H. Samuel, Univ of Quebec, Chicoutimi, QC, Canada; H.W. Doty, GM Powertrain, MCT, Milford, NH; S. Valtierra, Corporativo Nemak, Garza Garcia, NL, Mexico

04-008 Effect of Bi and Ca Additions on the Microstructure of Sr-Modified 319 Type Alloys Under Variable Cooling Conditions—S. El-Hadad, A.M. Samuel, F.H. Samuel, Univ of Quebec, Chicoutimi, QC, Canada; H.W. Doty, GM Powertrain, MCT, Milford, NH; S. Valtierra, Corporativo Nemak, Garza Garcia, NL, Mexico

04-009 Natural Aging and Heat Treatment of A356 Aluminum Alloy—J.F. Hernandez-Paz, F. Paray, J.E. Gruzleski, McGill Univ, Montreal, QC, Canada; D. Emadi, CANMET/MTL, Ottawa, ON, Canada

04-018 New Approaches to Melt Treatment of Al-Si Alloys: Application of Thermal Analysis Technique—S. Nafisi, R. Ghomashchi, Univ of Quebec, Chicoutimi, QC, Canada; J. Hedjazi, S.M.A. Boutorabi, Iran Univ of Science & Technology, Narmak, Tehran, Iran


04-023 Using Helium to Increase Heat Transfer at the Metal/Mold Interface in Permanent Mold Casting—X. Wan, R.D. Pehlke, Univ of Michigan, Ann Arbor, MI

04-024 Agglomeration and Sedimentation of TiB₂ During Remelting and Dilution of Al-3Ti-1B Grain Refiner—B. Zhang, Mississippi State Univ, Starkville, MS; D.R. Poirier, Univ of Arizona, Tucson, AZ

04-032 Revisiting the ASTM B108 Test Bar Mold for Quality Control of Permanent Mold Cast Aluminum Alloys—D. Emadi, L.V. Whiting, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada; D. Larouche, Laval Univ, Quebec, Canada

04-037 Effects of Pressure Applied During Feeding on Porosity Reduction With Reference to Fatigue Behavior—B. Zhang, R. Luck, J.T. Berry, Mississippi State Univ, Starkville, MS

04-041 Application of Aluminum Direct Pouring Technology on Horizontally Parted Automated Sand Molding Equipment—R.P. Pischel, Foseco Metallurgical, Cleveland, OH

04-042 Application of Artificial Neural Networks in Prediction of Mechanical Properties of Cast Aluminum Alloys—D. Emadi, L.-A. Sullivan, CANMET/MTL, Ottawa, ON, Canada


04-057 Semi Solid Processing of Hypereutectic Alloys—D. Saha, D. Apelian, Worcester Polytechnic Institute, Worcester, MA; R. DasGupta, SPX Contech, Dowagiac, MI
04-063  Dross Formation During Solidification of Aluminum 5182 Alloy RSI—Q. Han, Oak Ridge National Lab, Oak Ridge, TN

04-065  Prototype Castings of Aluminum Fly Ash Alloys—P.K. Rohatgi, J.K. Kim, Univ of Wisconsin, Milwaukee, WI; D. Weiss, Eck Industries, Manitowoc, WI; D. Presny, SAIC Corp, Madison, WI

04-072  Multidimensional Analysis of Interface Heat Flux in Metallic Molds During Solidification of Aluminum Alloy Plate Castings—H.C. Kamath, T.S. Prasanna-Kumar, Indian Institute of Technology-Madras, Chennai, India

04-075  Quality Issues in Aluminum Net-Shape Castings—G.K. Sigworth, Nemak, S.A. de C.V., Garza Garcia, NL, Mexico; C.H. Caceres, Univ of Queensland, Brisbane, Australia

04-076  Development Program on Natural Aging Alloys—G.K. Sigworth, O. Rios, GKS Engineering Services, Dunedin, FL; J. Howell, M. Kaufman, Univ of Florida, Gainesville, FL

04-077  Influence of Casting Conditions on Mechanical Properties of A356 Aluminum Alloy Permanent Mold Cast ASTM B108 Test Bars—F. Chiesa, Centre Integre de Fonderie et de Metallurgie, Trois-Rivieres, QC, Canada; T. Boisvert, T. Houde, D. Lavoie, College de Trois-Rivieres, Trois-Rivieres, QC, Canada

04-082  Permanent Mold Casting of Prototype Components in Al-Mg Alloy 535.0—Y. Fasoyinu, D. Cousineau, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada

04-085  Molten Metal Supply System Design—An Integrated System Approach—V. Srinivasan, GM Powertrain, Saginaw, MI

04-087  Microsegregation Effect of Copper in Aluminum-Silicon Casting Alloys—J. Cho, C.R. Loper Jr, Univ of Wisconsin, Madison, WI; X. Yan, Alcoa, Pittsburgh, PA

04-089  T5 Aging Response of A356/357 Hypoeutectic Al-Si Foundry Alloys Under Conditions of Varying Quench Rate From the Mould—L. Purdon, J.F. Major, Alcan International Ltd, Kingston, ON, Canada

04-117  Accurately Integrating Pressure Curves Into Flow Simulations for Low Pressure Die Casting Analyses—S. Elmore, M. McLaughlin, C.W. Kim, EEK Inc, Walled Lake, MI; G. Backer, Flow Logic, Southfield, MI

04-130  Microstructure and Mechanical Properties of Al-Cu Casting Alloys—Effect on Addition of Mischmetal—M. Shkuka, B.J. Yang, R.W. Smith, Queen’s Univ, Kingston, ON, Canada; M. Sadayappan, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada

04-135  Solidification Characteristics at Chill Surface of Castings—B. Ma, B.J. Yang, R.W. Smith, Queen’s Univ, Kingston, ON, Canada; M. Gallerneault, Alcan International Ltd, Kingston, ON, Canada
COPPER ALLOY, Div. 3

04-109 Optimization of Composition and Mechanical Properties of Aluminum Bronze Alloy C95400—M. Sadayappan, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada; H.T. Michels, Copper Development Assn, New York, NY

04-112 Fading of Grain Refinement in Permanent Mold Cast Copper Alloys—M. Sadayappan, J.P. Thomson, R. Zavadil, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada; H.T. Michels, Copper Development Assn, New York, NY

MOLDING METHODS & MATERIALS, Div. 4

04-001 Influence of Chemical Binder Core Sand Contamination on Green Sand Molding Properties—25 Years of Controversy (Silver Anniv. Paper)—R.L. Naro, ASI International Ltd, Cleveland, OH

04-020 The Need for Speed: or Measurement and Optimization of Cure Speed in PUCB Binders—R. Showman, K. Schumacher, R. Studebaker, Ashland Specialty Chemical Co, Dublin, OH

04-027 Hot Distortion Studies in Phenolic Urethane Cold Box System—S.I. Bakhtiyarov, Auburn Univ, Auburn AL; C.H. Sherwin, Citation Corp, Bay Minette, AL; R.A. Overfelt, Auburn Univ, Auburn, AL

04-029 Developing New PUCB Binders for Aluminum Casting Applications—J.A. Rigel, G.P. Sturtz, Ashland Specialty Chemical Co, Dublin, OH

04-030 New Low VOC Phenolic-Urethane No-Bake Binder System—K.K. Chang, J. Kroker, Ashland Specialty Chemical Co, Dublin, OH

04-035 Simulation of Directionally Solidified Grain Morphology for Precision Casting of MAR-M-247LC Alloy and Its Experimental Verification—K-S. Ho, W.-S. Hwang, National Cheng Kung Univ, Tainan, Taiwan


04-059 Customized SO2 Curable Cold Box Binders—J. Kroker, R. Shriver, X. Wang, Ashland Specialty Chemical Co, Dublin, OH

04-062 Influence of Chemical Composition on Hot Tearing Susceptibility in FSX-414 Alloy—Q. Han, Oak Ridge National Lab, Oak Ridge, TN


04-081 Thermophysical Properties of Zircon and Fused Silica-Based Shells for Investment Casting—A.S. Sabau, Oak Ridge National Lab, Oak Ridge, TN; S. Viswanathan, Sandia National Lab, Albuquerque, NM
Versatile Core Sand Test Method—S.G. Baker, J.M. Werling, Indianapolis Casting Corp, Indianapolis, IN

Green Sand Without Seacoal—V.S. LaFay, S.L. Neltner, Hill and Griffith Co, Cincinnati, OH

Baumé: Complete Coating Control? Phase II: Variability of Baumé as a Coating Control Tool—S.R. Giese, AFS 4-F Committee, Des Plaines, IL


Investment Casting Shell Mold Drying Model—V.F. Okhuysen, Cal Poly Univ, Pomona, CA

Influence of Bismuth Addition on Primary Austenite Dendrite in Gray Cast Iron—L. Winardi, C.R. Loper Jr, Univ of Wisconsin, Madison, WI


Investigation on the Effect of Surface Roughness on the Static Mechanical Properties of Thin-Wall Ductile Iron Castings—J.W. Torrance, D.M. Stefanescu, Univ of Alabama, Tuscaloosa, AL


Mold Surface Analysis Evaluation of Inclusion Defects Occurring in Cast Iron Produced in Green Sand Molds—H. Kambayashi, H. Une, Tsuchiyoishi Industry Corp, Shimane, Japan; Y. Kurokawa, Tsuchiyoishi Industry Corp, Hiroshima, Japan; T. Ito, S. Mikamoto, Yoshiwa Industry Corp, Shimane, Japan; H. Miyake, Kansai Univ, Osaka, Japan

Effects of Room Temperature Aging on Ductile Iron—V.L. Richards, D.C. VanAken, O.P. Mereau, Univ of Missouri, Rolla, MO; W.M. Nicola, Consultant, Warsaw, IN


Controlling Nodularity in Thin-Wall Compacted Graphite Iron Castings—R.E. Showman, R.C. Aufderheide, Ashland Specialty Chemical Co, Dublin, OH
<table>
<thead>
<tr>
<th>Paper Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-068</td>
<td>Effect of Bi on Formation of Microstructure and Mechanical Properties of Ductile Iron Castings With Thin-Wall Section</td>
<td>J.H. Choi, J.K. Oh, C.O. Choi, Dong-A Univ, Busan, Korea; J.K. Kim, P.K. Rohatgi, Univ of Wisconsin, Milwaukee, WI</td>
</tr>
<tr>
<td>04-092</td>
<td>Development of In-Mold/In-Filter Inoculation for Thin-Wall Cast Iron</td>
<td>Y.S. Lerner, Univ of Northern Iowa, Cedar Falls, IA; D. Craig, L. Aubrey, Selee Corp, Hendersonville, NC; T. Margaria, R. Siclari, Pechiney Electrometallurgy, Paris, France</td>
</tr>
<tr>
<td>04-096</td>
<td>Effects of Residual Aluminum on Solidification Characteristics of Un-Inoculated and Ca/Sr Inoculated Gray Irons</td>
<td>M. Chisamera, I. Riposan, S. Stan, Politehnica Univ, Bucharest, Romania; T. Skaland, Elkem, ASA, Kristiansand, Norway</td>
</tr>
<tr>
<td>04-097</td>
<td>Prediction of Gray Iron Tensile Strength by the Separation of Variables</td>
<td>F. Mampaey, WTCM Materials Processing, Zwijnaarde, Belgium</td>
</tr>
<tr>
<td>04-106</td>
<td>Behavior of Hardness and Retained Austenite in Heat Treatment of High Chromium Cast Iron for Abrasive Wear Resistance</td>
<td>S. Inthidech, P. Sricharoenchai, Chulalongkorn Univ, Bangkok, Thailand; N. Sasaguri, Y. Matsubara, Kurume National College of Technology, Kurume, Japan</td>
</tr>
<tr>
<td>04-107</td>
<td>Effect of Alloying Elements on Behavior of Hardness and Retained Austenite of Eutectic High Chromium Cast Irons</td>
<td>P. Sricharoenchai, S. Inthidech, Chulalongkorn Univ, Bangkok, Thailand; N. Sasaguri, Y. Matsubara, Kurume National College of Technology, Kurume, Japan</td>
</tr>
<tr>
<td>04-126</td>
<td>Influence of Graphite/Austenite Interface on Formation of Ferrite or Pearlite in Cast Iron</td>
<td>R. Fuoco, IPT Tech Research Institute, São Paulo, Brazil; C.S. Cabezas, Tupy Fundicoes S.A., Joinville, SC, Brazil</td>
</tr>
</tbody>
</table>

**MAGNESIUM, Div. 6**

<table>
<thead>
<tr>
<th>Paper Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-028</td>
<td>First V-Process Casting of Magnesium</td>
<td>S.I. Bakhtiyarov, R.A. Overfelt, Auburn Univ, Auburn, AL</td>
</tr>
<tr>
<td>04-094</td>
<td>Development of New Coating for Magnesium Permanent Mold Casting</td>
<td>S.M. Bell, B.R. Davis, Kingston Process Metallurgy Inc, Kingston, ON, Canada; J.P. Thomson, CANMET/MTL, Ottawa, ON, Canada</td>
</tr>
<tr>
<td>04-120</td>
<td>Low Pressure Casting of Magnesium Alloys AZ91 and AM50</td>
<td>J.P. Thomson, S. Xu, M. Sadayappan, P.D. Newcombe, L. Millette, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada</td>
</tr>
<tr>
<td>04-121</td>
<td>Effect of C2Cl6 on Mechanical Properties and Microstructure of Gravity Permanent Mold Cast AZ91E</td>
<td>J.P. Thomson, P. Liu, M. Sadayappan, M. Sahoo, CANMET/MTL, Ottawa, ON, Canada</td>
</tr>
</tbody>
</table>
MELTING METHODS & MATERIALS, Div. 8

04-100 Technology Development of Tuyere Coke Powder Injection for Carbon Pickup in Cupola—E.N. Pan, Y.L. Wen, National Taiwan Univ, Taipei, Taiwan; Y.Y. Yang, S.J. Deng, Shin Nan Casting Factory Co, Ltd, Tainan, Taiwan


04-159 Unplanned Blackout and Its Consequences: Power and City Water Outages at Ford’s Cleveland Plant—D. Rowe, Ford Motor Co, Brook Park, OH; W.J. Duca, Duca Mfg Inc, Boardman, OH

STEEL, Div. 9


ENVIRONMENTAL, HEALTH & SAFETY, Div. 10


04-090 Foundry Ventilation Challenges—Past, Present and Future—F.H. Kohloff, AFS, Des Plaines, IL; R.C. Scholz, RMT, Brookfield, WI

LOST FOAM CASTING, Div. 11

04-004 Process Control of Metal Penetration Defect in Lost Foam Castings—W. Sun, H.E. Littleton, Univ of Alabama, Birmingham, AL

04-054 Thermal and Morphological Characterization of EPS Foam and Relationship With Processing Parameters—R.S. Benson, D. Penumadu, I. Sen; Univ of Tennessee, Knoxville, TN; R. Michaels, Industrial Analytics Corp, Seymour, TN

04-066 Characterization of Rheological Properties of Lost Foam Casting Coating slurries—D. Penumadu, X. Chen, Univ of Tennessee, Knoxville, TN; C.K. Johnson, C. Johnson & Assoc, Homer Glen, IL
04-070 Advantages of the Low Pressure Lost Foam Casting Process—J. Bast, M. Aitsuradse, T. Hahn, Freiberg Univ of Mining & Technology, Freiberg, Germany

04-080 Folds Formation and Prevention in the Lost Foam Aluminum Process—Q. Zhao, Metal Casting Technology, Inc, Milford, NH; T.W. Gustafson, M. Hoover, GM Powertrain, Saginaw, MI; M.C. Flemings, Massachusetts Institute of Technology, Cambridge, MA

04-110 Comparison of Aluminum Alloys and EPS Foams for Use in the Lost Foam Casting Process—D.R. Hess, GM Powertrain, Saginaw, MI

MARKETING, Div. 14

04-093 Tools for Developing a Fact-Based Marketing Plan—R. Bake, Ashland Specialty Chemicals, Dublin, OH