

# Table of Contents

## Committees

## Preface

## 1. Business and Environment

### Why Choose Magnesium?

T.B. Abbott 3

### Sustainable Development for the 21st Century: Challenges and Opportunities for Light Metals

D. Apelian and J.L. Jorstad 7

### Recent Patenting Activity in Electrolytic Aluminium Production Technology

E.C. Patterson and R.N. Cross 13

### Life Cycle Environmental Impact of Magnesium Instrument Panel

P. Koltun and A. Tharumarajah 17

### Greenhouse Gas Emissions Attributable to High Pressure Die Casting

A. Tharumarajah, D.R. Gunasegaram and P. Koltun 21

### ATM: A Greener Variant of High Pressure Die Casting

D.R. Gunasegaram, M. Givord and R.G. O'Donnell 27

### Die Casting Improvements through Melt Shear

R.G. O'Donnell, D.R. Gunasegaram and M. Givord 33

## 2. Joining of Light Metal Alloys

### Effect of Welding Parameters on Microstructure and Tensile Properties of Friction Stir Welded 6061 AL Joints

A.H. Feng, D.L. Chen and Z.Y. Ma 41

### Residual Stresses and Distortions in Aluminum Alloy Sheet after Welding under Pre-Tension

J.Y. Li, Y.M. Lu, Z.P. Liu and M.M. Zhang 45

### Structural Bonding for Lightweight Construction

M. Hornung and M. Hajj 49

### Quantitative Investigation of Hot Tearing of Al-Cu Alloy (206) Cast in a Constrained Bar Permanent Mold

S.M. Li, D. Apelian and K. Sadayappan 57

### Friction Stir Processing: A Technique for Microstructural Refinement in Metallic Materials

S. Lathabai, R. Migeon, V.K. Tyagi, R.G. O'Donnell and Y. Estrin 63

## 3. Magnesium Medical

### The Influence of Heat Treatment and Plastic Deformation on the Bio-Degradation of a Mg-Y-RE Alloy

P. Gunde, A. Furrer, A.C. Hänzi, P. Schmutz and P.J. Uggowitzer 71

### Design Strategy for Microalloyed Ultra-Ductile Magnesium Alloys for Medical Applications

A.C. Hänzi, A.S. Sologubenko and P.J. Uggowitzer 75

### Magnesium Alloys as Biodegradable Implants

M.B. Kannan and R.K. Singh Raman 83

## 4. Titanium Aerospace

### High Pressure Coolant Application in Milling Titanium

S. Palanisamy, D. Townsend, M. Scherrer, R. Andrews and M.S. Dargusch 89

|                                                                                                                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Simulation of Flow Field and Particle Trajectory in EB Cold Hearth Melting Process</b><br>Y.M. Zhang, H. Pfeifer, B. Friedrich and L. Zhou                                                                                              | 93  |
| <b>Research on Titanium Alloys with High Toughness and High Damage Tolerance</b><br>Y.Q. Zhao, H.L. Qu and J. Chen                                                                                                                         | 97  |
| <b>Studies on Hydrogen Embrittlement of Ti-2Al-2.5Zr Alloy</b><br>L. Wang, Q. Luo, Y.Z. Liu, Y. Chen and D.Q. Sun                                                                                                                          | 101 |
| <b>Mechanical Alloying and Sintering of Ti-10Wt.% Mg Powders</b><br>C. Machio, D. Nyabadza, H.K. Chikwanda, M. Phasha and V.M. Sibanda                                                                                                     | 105 |
| <b>Mechanical Properties of Porous Stainless Steel Metal Fibre Media</b><br>J.C. Qiao, Z.P. Xi, H.P. Tang, J.Y. Wang and J.L. Zhu                                                                                                          | 109 |
| <b>Quantitative Analysis of Alpha Morphology Changes of Ti-17 Alloy with a Lamellar Starting Microstructure</b><br>W.D. Zeng, Y.G. Zhou, J.H. Zhou and X.Y. Wang                                                                           | 113 |
| <b>Machining of Light Metals: Challenges for Surface Engineering</b><br>E.D. Doyle and S.J. Dowey                                                                                                                                          | 117 |
| <b>Aero-Engine Titanium from Alloys to Composites</b><br>P. Doorbar, M. Dixon and A. Chatterjee                                                                                                                                            | 127 |
| <b>Meltless Ti – A New Light Metals Industry</b><br>A. Woodfield, E. Ott, J. Blank, M. Peretti, D. Linger and L. Duke                                                                                                                      | 135 |
| <b>Implementing the Direct Powder Route for Titanium Mill Product: Continuous Production of CP Sheet</b><br>N.A. Stone, G.M.D. Cantin, M.A. Gibson, T. Kearney, S. Lathabai, D. Ritchie, R. Wilson, M. Yousuff, R. Rajakumar and K. Rogers | 139 |
| <b>Numerical and Experimental Investigation of the Heat-Affected Zone in a Laser-Assisted Machining of Ti-6Al-4V Alloy Process</b><br>J.H.N. Yang, M. Brandt and S.J. Sun                                                                  | 143 |
| <b>Progress Made by the South African Light Metals Development Network</b><br>O. Damm and W. du Preez                                                                                                                                      | 147 |
| <b>Chemistry Control in Electron Beam Deposited Titanium Alloys</b><br>C.A. Brice, B.T. Rosenberger, S.N. Sankaran, K.M. Taminger, B. Woods and R. Nasserafi                                                                               | 155 |
| <b>High Speed Machining of Titanium Alloys</b><br>J.E. Barnes, Y.C. Shin, M. Brandt and S.J. Sun                                                                                                                                           | 159 |
| <b>Evaluation of Low Cost Titanium Alloy Products</b><br>J.E. Barnes, W. Peter and C.A. Blue                                                                                                                                               | 165 |
| <b>The Effect of Aluminum Equivalent and Molybdenum Equivalent on the Mechanical Properties of High Strength and High Toughness Titanium Alloys</b><br>Y.L. Yang, W.Q. Wang, F.L. Li, W.Q. Li and Y.Q. Zhang                               | 169 |
| <b>The Microstructure and Mechanical Properties of High-Strength and High-Toughness Titanium Alloy BTi-6554 Bar</b><br>W.Q. Wang, Y.L. Yang, Y.Q. Zhang, F.L. Li, H.L. Yang and P.H. Zhang                                                 | 173 |
| <b>The Effect of Heat Treatment System on Mechanical Properties of Titanium Alloy BTi-6554</b><br>X.X. Wang, W.Q. Wang, W.Q. Li, F.L. Li and Y.L. Yang                                                                                     | 177 |

## 5. Simulation, Modelling and Material Science

|                                                                                                                                                   |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Thermodynamic Aspects of Tin Segregation during Solidification of Aluminium Alloys</b><br>R. Schmid-Fetzer                                     | 183 |
| <b>Simulation of Deform Behavior of WE43 Magnesium Alloy Based on DEFORM-3D</b><br>Q. Wang, J.C. Gao and W.J. Niu                                 | 191 |
| <b>Modelling Microstructural Evolution and Property Development in the ARC Centre of Excellence for Design in Light Metals</b><br>C.R. Hutchinson | 195 |
| <b>Application of Microstructure Simulation by Modified CA Method to Al Alloy Casting Production</b><br>Q.Y. Xu, B. Li and B.C. Liu               | 199 |
| <b>Modelling of Precipitation Hardening in Casting Aluminium Alloys</b><br>L. Wu and W.G. Ferguson                                                | 203 |

|                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Computer Modelling of Grain Boundaries for Optimizing the Properties of Polycrystalline Metallic Materials</b><br>K.J. Kurzydowski                    | 207 |
| <b>Mechanical Characterisation of Material Properties Using Instrumented Indentation Experiments</b><br>C. Moy, M. Bocciarelli, S.P. Ringer and G. Ranzi | 215 |

## 6. Light Metals Forming

|                                                                                                                                                                              |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Micro-Engineering the Stressed Macro-Interface and Enhancing the Performance of Mg/Al Bimetal Macrocomposites</b><br>M. Paramsothy, S.F. Hassan, N. Srikanth and M. Gupta | 221 |
| <b>The Challenge of Inhomogeneous Deformation in Magnesium and its Alloys</b><br>M.R. Barnett                                                                                | 227 |
| <b>Formability of Twin-Roll Cast Age-Hardenable Mg-Zn Alloys</b><br>K. Venkatesan, W. Borbidge, M. Kellam, D.R. East, M.A. Gibson and D. Liang                               | 233 |
| <b>Fine Grained AZ31 by Conventional Thermo-Mechanical Processing</b><br>N. Stanford                                                                                         | 239 |
| <b>Rotary Welder for Hot Billets</b><br>D. Jenista                                                                                                                           | 245 |
| <b>Development of High Performance Magnesium Alloys via Microstructure and Texture Control</b><br>J.W. Choi and K.S. Shin                                                    | 249 |

## 7. Magnesium Surface Modification

|                                                                                                                                                                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>A Preliminary Quantitative XPS Study of the Surface Films Formed on Pure Magnesium and on Magnesium-Aluminium Intermetallics by Exposure to High-Purity Water</b><br>M. Liu, S. Zanna, H. Ardelean, I. Frateur, P. Schmutz, G.L. Song, A. Atrens and P. Marcus | 255 |
| <b>Influence of Laser Surface Melting on the Microstructure and Corrosion Behaviour of ZE41 Magnesium Alloy</b><br>P.C. Banerjee, R.K.S. Raman, Y. Durandet and G. McAdam                                                                                         | 263 |
| <b>An Electroless E-Coating Bath Sealing Technique for a Phosphated Magnesium Alloy</b><br>G.L. Song                                                                                                                                                              | 269 |

## 8. Aluminium Surface Modification

|                                                                                                                                                                                                    |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b><i>In Situ</i> X-Ray Microtomography Investigation of the Deformation Mechanisms of Al-Cu Alloys in the Semi-Solid State</b><br>S. Terzi, L. Salvo, M. Suéry, J. Adrien, É. Maire and E. Boller | 275 |
| <b>A Novel Micro-Arc Anodising Process for Aluminium Alloys Containing High Silicon</b><br>Z.M. Shi and M.X. Zhang                                                                                 | 279 |

## 9. Titanium Medical

|                                                                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Surface Modification of Metallic Biomaterials for Orthopaedic Applications</b><br>M. Wang                                                                                          | 285 |
| <b>Laser Welding of Titanium and its Alloys for Medical Applications: Current Knowledge and Future Direction</b><br>A. Buddery, M.S. Dargusch, D.H. StJohn, J. Drennan and S. Nabulsi | 291 |
| <b><i>In Vitro</i> Cytotoxicity of Binary Ti Alloys for Bone Implants</b><br>Y.C. Li, C. Wong, J.Y. Xiong, P. Hodgson and C.E. Wen                                                    | 295 |
| <b>The Surface Modifications of Dental Implants that are made of a Near-<math>\beta</math> Type Titanium Alloy</b><br>J.Y. Han, Z.T. Yu, S. Yu, X.Q. Ma, J.L. Niu and X.J. He         | 299 |

|                                                                                                                                                                                                              |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Development of Biomedical Near <math>\beta</math> Titanium Alloys</b><br>Z.T. Yu, G. Wang, X.Q. Ma, M.S. Dargusch, J.Y. Han and S. Yu                                                                     | 303 |
| <b>Mechanical Compatability of Nanostructured Titanium with Human Bone</b><br>P. Cao, X.N. Zhang, D.L. Zhang and B. Gabbitas                                                                                 | 307 |
| <b>Biomimetic Coating on Pure Titanium Submitted to Different Surface Treatments</b><br>X.J. Wang, Y.C. Li, P. Hodgson and C.E. Wen                                                                          | 311 |
| <b>Latest Developments in Understanding the Grain Refinement of Cast Titanium</b><br>M.J. Bermingham, S.D. McDonald, M.S. Dargusch and D.H. StJohn                                                           | 315 |
| <b>Fabrication of an Apatite/Collagen Composite Coating on the NiTi Shape Memory Alloy through Electrochemical Deposition and Coating Characterisation</b><br>P.C. Banerjee, T. Sun, J.H.W. Wong and M. Wang | 319 |
| <b>Bioactive Hydroxyapatite Coating on Titanium-Niobium Alloy through a Sol-Gel Process</b><br>J.Y. Xiong, Y.C. Li, P. Hodgson and C.E. Wen                                                                  | 325 |

## 10. Aluminium Heat Treatment and Processing

|                                                                                                                                                                                           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Alloy Design for Heat Treatment of High Pressure Diecastings</b><br>R.N. Lumley, M. Gershenzon and D.R. Gunasegaram                                                                    | 331 |
| <b>Towards a More Holistic Approach to Quality Improvements in Aluminium Die Casting</b><br>S. Zanna, Y. Frayman, B. Gunn and S. Nahavandi                                                | 341 |
| <b>Decision and Design Methodologies for the Lay-Out of Modular Dies for High-Pressure-Die-Cast-Processes</b><br>Y. Queudeville, T. Ivanov, C. Nußbaum, U. Vroomen and A. Bührig-Polaczek | 345 |
| <b>Classification of Streaking Defects on Anodized Aluminium Extrusions</b><br>H.L. Zhu, X.Q. Zhang, M.J. Couper and A.K. Dahle                                                           | 349 |
| <b>Optimisation of the Solution Heat Treatment of Rheo-Processed Al-Cu-Mg-(Ag) Alloys A206 and A201</b><br>E.P. Masuku, H. Möller, R.D. Knutsen, L. Ivanchev and G. Govender              | 353 |
| <b>Thermal Fatigue Studies Using HF Induction Heating of Die Materials for Light Metals Casting</b><br>S. Gulizia, D. Jones, M.Z. Jahedi, T. Kearney and P. Koltun                        | 357 |
| <b>Microstructural Modification of A206 Aluminium via Friction Stir Processing</b><br>N. Sun and D. Apelian                                                                               | 361 |
| <b>The T5 Heat Treatment of Semi-Solid Metal Processed Aluminium Alloy F357</b><br>H. Möller, G. Govender and W. Stumpf                                                                   | 365 |

## 11. Innovation in Light Materials

|                                                                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Magnesium Matrix Composites Reinforced with Titanium Particles</b><br>K. Kondoh, M. Kawakami, J. Umeda and H. Imai                                                                 | 371 |
| <b>Cold Spray of Al-MMC Coatings on Magnesium Alloys for Improved Corrosion and Wear Resistance</b><br>K. Spencer, D. Fabijanic and M.X. Zhang                                        | 377 |
| <b>Characterization of Magnesium Automotive Components Produced by Super-Vacuum Die Casting Process</b><br>K. Sadayappan, W. Kasprzak, Z. Brown, L. Quimet and A.A. Luo               | 381 |
| <b>Rapid Manufacture in Light Metals Processing</b><br>S. Singamneni, N. McKenna, O. Diegel, D. Singh and A.R. Choudhury                                                              | 387 |
| <b>Mechanism of Improved Hydrogen Absorption Kinetics in Cast Mg-Ni Alloys</b><br>K. Nogita, S. Ockert, A. Duguid, J. Pierce and M. Greaves                                           | 391 |
| <b>Overview of Lightweighting Materials Research &amp; Development in the United States Freedomcar and Fuel Partnership</b><br>D.M. Paxton, J.A. Carpenter, P.S. Sklad and M.T. Smith | 395 |
| <b>Perspectives for Nanostructured Light Metals and Alloys</b><br>M. Lewandowska and K.J. Kurzydowski                                                                                 | 405 |
| <b>Mass Decomposition and Vehicle Lightweighting</b><br>M. Verbrugge, T. Lee, P.E. Krajewski, A.K. Sachdev, C. Bjelkengren, R. Roth and R. Kirchain                                   | 411 |

|                                                                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Processing of High Pressure Die Casting Alloys and Engineering Polymers to New Hybrid Metal/Plastic Products in a Combined Process</b>                                                  |     |
| M. Jakob, Y. Queudeville, U. Vroomen and A. Bührig-Polaczek                                                                                                                                | 419 |
| <b>Selective Enhancement of Tensile/Compressive Strength and Ductility of AZ31 Magnesium Alloy via Nano-<math>\text{Al}_2\text{O}_3</math> Reinforcement Integration Method Alteration</b> |     |
| M. Paramsothy, S.F. Hassan, N.Q. Bau, N. Srikanth and M. Gupta                                                                                                                             | 423 |
| <b>Nucleation and Growth during Reactions in Accumulative Roll Bonding of Ti/Al Multilayers</b>                                                                                            |     |
| D.K. Yang, P. Hodgson and C.E. Wen                                                                                                                                                         | 429 |
| <b>Influence of Ultrasonic Processing on Nano-Sized Particle Dispersion in Magnesium Matrix Nanocomposites</b>                                                                             |     |
| S.Y. Liu, F.P. Gao, Q.Y. Zhang and W.Z. Li                                                                                                                                                 | 433 |
| <b>Effect of Structure Relaxation on the Plastic Deformation Behaviour in a Zr-Based BMG under Indenter</b>                                                                                |     |
| H.W. Xie, P. Hodgson and C.E. Wen                                                                                                                                                          | 437 |

## 12. Magnesium Casting

|                                                                                                                                                                       |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Influence of SiC Particles on the Grain Refinement of an Mg-Al Alloy</b>                                                                                           |     |
| A. Schiffl and M. Easton                                                                                                                                              | 445 |
| <b>Mechanical Properties and Microstructures of Nano-Sized SiC Particles Reinforced AZ91D Nanocomposites Fabricated by High Intensity Ultrasonic Assisted Casting</b> |     |
| S.Y. Liu, F.P. Gao, Q.Y. Zhang and W.Z. Li                                                                                                                            | 449 |
| <b>On the Creep Resistance of HPDC Mg-RE Based Alloys</b>                                                                                                             |     |
| S.M. Zhu, M.A. Gibson, J.F. Nie, M. Easton and C.J. Bettles                                                                                                           | 453 |
| <b>Influence of Strontium, Silicon and Calcium Additions on the Properties of the AM50 Alloy</b>                                                                      |     |
| D. Fechner, C. Blawert, N. Hort and K.U. Kainer                                                                                                                       | 459 |
| <b>Room Temperature Formability of Mg Alloys</b>                                                                                                                      |     |
| D.H. Kang, D.W. Kim, S. Kim, G.T. Bae, K.H. Kim and N.J. Kim                                                                                                          | 463 |
| <b>Twin-Roll Cast Al-Clad Magnesium Alloy</b>                                                                                                                         |     |
| A.K. Prasada Rao, K.H. Kim, J.H. Bae, G.T. Bae, D.H. Shin and N.J. Kim                                                                                                | 467 |

## 13. Magnesium Microstructure and Properties

|                                                                                                      |     |
|------------------------------------------------------------------------------------------------------|-----|
| <b>Corrosion of AZ91 - Influence of the <math>\beta</math>-Phase Morphology</b>                      |     |
| M.C. Zhao, P.J. Uggowitzer, M. Liu, P. Schmutz, G. Song and A. Atrens                                | 473 |
| <b>Role of Solute Content on the Intermetallic Structure Development in HPDC Mg-Al Binary Alloys</b> |     |
| A.V. Nagasekhar, C.H. Cáceres and M. Easton                                                          | 479 |
| <b>Microstructure and Texture of AZ80 Magnesium Alloy Sheet Rolled by High Speed Warm Rolling</b>    |     |
| T. Sakai, Y. Watanabe and H. Utsunomiya                                                              | 483 |
| <b>Solute Partitioning to Enhance Mechanical Properties of Aged Aluminium Alloys</b>                 |     |
| I.J. Polmear and R.N. Lumley                                                                         | 487 |

## 14. Titanium Near Net Shape

|                                                                                                                                                    |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Microstructural and Mechanical Properties of Titanium Matrix Composites Reinforced with Nano Carbon Materials via Powder Metallurgy Process</b> |     |
| K. Kondoh, T. Threrujirapapong, J. Umeda, H. Imai and B. Fugetsu                                                                                   | 495 |
| <b>Thermomechanical Consolidation of Ti/Al/Cr Composite (Composition: Ti-47Al-2Cr (at %)) Powders</b>                                              |     |
| V. Nadakuduru, D.L. Zhang, P. Cao and B. Gabbitas                                                                                                  | 501 |
| <b>Direct Manufacturing of Titanium Parts by Cold Spray</b>                                                                                        |     |
| M.Z. Jahedi, S.H. Zahiri, S. Gulizia, B. Tiganis, C. Tang and D. Fraser                                                                            | 505 |
| <b>Sintering of Titanium Powder Compacts for Containerless Hot Isostatic Pressing</b>                                                              |     |
| R.J. Low, I.M. Robertson, M. Qian and G.B. Schaffer                                                                                                | 509 |

|                                                                                                                                                                       |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Consolidation of Titanium, and Ti-6Al-4V Alloy Powders by Powder Compact Forging</b><br>D.L. Zhang, S. Raynova, V. Nadakuduru, P. Cao, B. Gabbitas and B. Robinson | 513 |
| <b>Ti-Mg Alloy Powder Synthesis via Mechanochemical Reduction of TiO<sub>2</sub> by Elemental Magnesium</b><br>T. Mushove, H.K. Chikwanda, C. Machio and S. Ndlovu    | 517 |

## 15. Magnesium Processing

|                                                                                                                                                      |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Effect of Grain Size on the Performance of Extruded Magnesium Alloy Tubes in Three-Point Bending</b><br>T.B. Hilditch, D. Atwell and A.G. Beer    | 523 |
| <b>Tensile and Compressive Properties for Crashworthiness Assessment of a Large AZ31 Extrusion</b><br>S. Xu, W.R. Tyson, R. Bouchard and R. Eagleson | 527 |
| <b>Quantitative Determination on Hot Tearing in Mg-Al Binary Alloys</b><br>Z. Zhen, N. Hort, Y.D. Huang, N. Petri, O. Utke and K.U. Kainer           | 533 |

## 16. Aluminium Microstructure

|                                                                                                                                                           |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Novel Grain Boundary Solute Architecture in a Nanostructured Ultra-High Strength 7075 Aluminium Alloy</b><br>P.V. Liddicoat, X.Z. Liao and S.P. Ringer | 543 |
| <b>Research and Development of Non-Ferrous Melting Energy</b><br>S. Prasertsook                                                                           | 547 |
| <b>Mechanical Properties of an Accumulative Roll Bonded Aluminium Alloy Composite</b><br>O. Al-Buhamad, M.Z. Quadir and M. Ferry                          | 551 |
| <b>Work- and Age-Hardening Behaviour of a Commercial AA7108 Aluminium Alloy</b><br>I. Westermann, O.S. Hopperstad, K. Marthinsen and B. Holmedal          | 555 |
| <b>TiAl Turbochargers for Automobile Application</b><br>J. Zhang and K. Xia                                                                               | 559 |
| <b>Fatigue Crack Propagation Mechanisms of Long and Small Cracks in Al-Si-Mg and Al-Mg Cast Alloys</b><br>D.A. Lados                                      | 563 |
| <b>Shearing Behaviour and Texture Evolution in Aluminium Sheet Deformed by Accumulative Roll Bonding</b><br>K.D. Lau, M.Z. Quadir and M. Ferry            | 575 |

## 17. Aluminium Casting

|                                                                                                                                                                                                                                    |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Replication of Microscale Features via Investment Casting Using the Example of an Aluminium Intake Manifold of a Gasoline Engine with an Inner Technical Shark Skin Surface</b><br>T. Ivanov, A. Bührig-Polaczek and U. Vroomen | 581 |
| <b>Counter-Gravity Casting Equipment and Technologies for Thin-Walled Al-Alloy Parts in Resin Sand Molds</b><br>W.Q. Jie, X.L. Li and Q.T. Hao                                                                                     | 585 |
| <b>The Ablation Casting Process</b><br>J. Grassi, J. Campbell, M. Hartlieb and F. Major                                                                                                                                            | 591 |
| <b>Development of Aluminium Alloys for High Temperature Applications in Diesel Engines</b><br>W. Kasprzak, D. Emadi, M. Sahoo and M. Aniolek                                                                                       | 595 |
| <b>Optimization of Aluminium Die Casting Alloys for Enhanced Properties</b><br>L. Wang, D. Apelian and M.M. Makhlof                                                                                                                | 601 |
| <b>The Influence of Intensification Pressure on the Gate Microstructure of AlSi3MgMn High Pressure Die Castings</b><br>S. Otarawanna, C.M. Gourlay, H.I. Laukli and A.K. Dahle                                                     | 607 |

**Metallurgical and Foundry Parameters for the SSM Forming of High Strength Aluminium-Zinc-Magnesium-Copper (7075) Alloy**

L.G. Juganan, G. Govender and A.F. Mulaba Bafubiandi

611

**18. Powder Metallurgy and Near Net Shape**

**The *In Situ* Fabrication of Al-AlN Composites from Metal Powders and their Resistance to Wear and Cavitation**

M. Qian, K. Kondoh, D. Kent, J. Umeda, P. Yu and G.B. Schaffer

617

**Electron Beam Processing of Aluminium Alloys**

P. Yu, M. Qian, D. Tomus, C.A. Brice, G.B. Schaffer and B.C. Muddle

621

**Pressure Assisted Sintering of an Aluminium Alloy**

S.J. Bonner, G.B. Schaffer and J.Y. Yao

627

**Formation of Aluminium Nitride during Sintering of Powder Injection Moulded Aluminium**

D. Kent, G.B. Schaffer, M. Qian and Z.Y. Liu

631

**Rapid Prototyping of Aluminium Alloy Parts: The Effect of Infiltration Atmosphere**

P. Yu, M. Qian and G.B. Schaffer

635

**Aluminium Cutting Heat Distribution - Thermal Transfer Function Approach**

J. Vyroubal and J. Maly

639