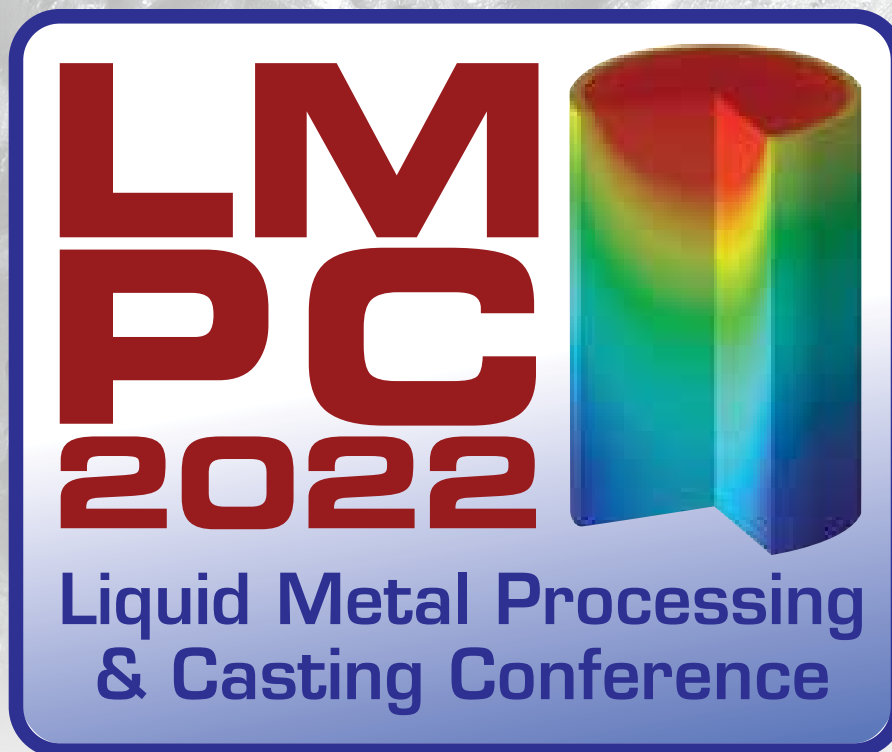




September 18-21, 2022

Bellevue Hotel • Philadelphia, Pennsylvania, USA

FINAL TECHNICAL PROGRAM

SPONSORED BY:



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TMS Materials Processing & Manufacturing Division and
the TMS Process Technology and Modeling Committee

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SCHEDULE OF EVENTS

Current as of September 6, 2022 and subject to change.

Sunday, September 18		
	Time	Location
Registration	5:00 PM - 7:30 PM	Ballroom Foyer
Welcome Reception	6:00 PM - 7:30 PM	Conservatory - 12th Floor
Monday, September 19		
	Time	Location
Registration	7:00 AM - 5:00 PM	Ballroom Foyer
Exhibits/Posters Set-up	7:30 AM - 8:00 AM	Ballroom Balcony
Welcome Remarks	8:00 AM - 8:10 AM	Grand Ballroom
Keynote	8:10 AM - 8:55 AM	Grand Ballroom
Technical Sessions	8:55 AM - 11:25 AM	Grand Ballroom
Exhibition and Break	10:10 AM - 10:35 AM	Ballroom Balcony
Panel Discussion	11:25 AM - 12:00 PM	Grand Ballroom
Lunch	12:00 PM - 1:20 PM	Red/Clover Room
Technical Sessions	1:20 PM - 5:10 PM	Grand Ballroom
Exhibition and Break	3:05 PM - 3:30 PM	Ballroom Balcony
Poster Session & Reception	5:10 PM - 6:30 PM	Ballroom Balcony
Mothers' Room	7:00 AM - 5:00 PM	See registration desk
Tuesday, September 20		
	Time	Location
Registration	7:30 AM - 5:00 PM	Ballroom Foyer
Technical Sessions	8:00 AM - 11:25 AM	Grand Ballroom
Exhibition and Break	10:10 AM - 10:35 AM	Ballroom Balcony
Panel Discussion	11:25 AM - 12:00 PM	Grand Ballroom
Lunch	12:00 PM - 1:20 PM	Red/Clover Room
Organizer Committee Lunch	12:00 PM - 1:20 PM	Private
Technical Sessions	1:20 PM - 5:10 PM	Grand Ballroom
Exhibition and Break	3:05 PM - 3:30 PM	Ballroom Balcony
Conference Pre-Dinner Reception	5:30 PM - 6:00 PM	Red/Clover Room
Conference Dinner	6:00 PM - 7:30 PM	Red/Clover Room
Mothers' Room	7:30 AM - 5:00 PM	See registration desk
Wednesday, September 21		
	Time	Location
Registration	7:30 AM - 3:00 PM	Ballroom Foyer
Technical Sessions	8:00 AM - 11:25 AM	Grand Ballroom
Exhibition and Break	10:10 AM - 10:35 AM	Ballroom Balcony
Exhibit/Poster Removal	10:35 AM - 12:00 PM	Ballroom Foyer
Lunch	12:00 PM - 1:20 PM	Red/Clover Room
Technical Sessions	1:20 PM - 3:30 PM	Grand Ballroom
Closing Remarks	3:30 PM - 3:45 PM	Grand Ballroom
Mothers' Room	7:30 AM - 3:45 PM	See registration desk

Monday Plenary

Monday AM
September 19, 2022 **Room: Grand Ballroom**
Location: Bellevue Hotel

Session Chair: C. O'Connell, Special Metals

8:00 AM Introductory Comments

8:10 AM Keynote

The Road to Zero Defects in Nickel Superalloys: *John DeBarbadillo*¹;
¹Special Metals Corporation

Vacuum Arc Remelting I

Monday AM
September 19, 2022 **Room: Grand Ballroom**
Location: Bellevue Hotel

Session Chair: A. Mitchell, University of British Columbia

8:55 AM

Transient Heat Flux Measurements in Vacuum Arc Remelting of Nitinol: *Kyle Fezi*¹; Nils Hinniger¹; ¹Fort Wayne Metals

9:20 AM

Use of Accommodation Coefficients in Modeling of Helium Heat Transfer in VAR: Examination of Their Uncertainty and Effect on Modeling: *Richard Smith*¹; ¹Carpenter Technology

9:45 AM

Experimental Setup for Mold Surface Temperature Measurement During Vacuum Arc Remelting Process: Application to Titanium Alloys: *Julien Banos*¹; Julien Jourdan²; Thibault Quatravaux²; Alain Jardy²; ¹TIMET Savoie; ²Institut Jean Lamour

10:10 AM Break

10:35 AM

A Novel Technique to Measure the Arc Gap During Vacuum Arc Remelting Using Magnetic Fields: *Daniel McCulley*¹; Matthew Cibula¹; Nathan Pettinger¹; Joshua Motley¹; Paul King¹; ¹Ampere Scientific

11:00 AM

Power Update During Vacuum Arc Remelting Using Vision Systems: *Ashish Patel*¹; Nir Herscovici¹; ¹Timet

11:25 AM Panel Discussion

Vacuum Arc Remelting II

Monday PM
September 19, 2022 **Room: Grand Ballroom**
Location: Bellevue Hotel

Session Chair: H. Holzgruber, INTECO Special Melting Tech GmbH

1:20 PM Introductory Comments

1:25 PM

Characterization of Vacuum Arc Remelting with a High-density Magnetic Sensor Array: *Matthew Cibula*¹; Daniel McCulley¹; Nathan Pettinger¹; Joshua Motley¹; Paul King¹; ¹Ampere Scientific

1:50 PM

Effect of Transient Heat Flux on the Predictions of Pool Characteristics During Vacuum Arc Remelting of Nitinol: *Kyle Fezi*¹; Alex Archambault¹; ¹Fort Wayne Metals

2:15 PM

A Numerical Study on the Impact of a Time-varying Axial Magnetic Field On An Industrial Vacuum Arc Remelting (VAR) Process: *Ebrahim Karimi Sibaki*¹; Abdellah Kharicha¹; ¹Univ of Leoben

2:40 PM

Effects of Controllable Transverse Magnetic Fields During the VAR Melt Process: *Joshua Motley*¹; John Henjum²; Matthew Cibula¹; Daniel McCulley¹; Nathan Pettinger¹; Paul King¹; Gordon Alanko²; ¹Ampere Scientific; ²ATI Specialty Alloys and Products

3:05 PM Break

Electroslag Refining & Vacuum Arc Remelting

Monday PM
September 19, 2022 **Room: Grand Ballroom**
Location: Bellevue Hotel

Session Chair: A. Kharicha, Montanuniversität

3:30 PM

VAR and ESR Steels -a Critical Appraisal: *John Campbell*¹; ¹University of Birmingham

4:00 PM

Comments on the Columnar/Equiax Transition in Remelted Ingots: *Alec Mitchell*¹; ¹University of British Columbia

4:30 PM

Manufacturing Large Superalloy Ingots for Advanced Energy Systems: *John De Barbadillo*¹; Brian Baker¹; Corey O'Connell¹; ¹Special Metals

Electroslag Refining I

Tuesday AM
September 20, 2022 **Room: Grand Ballroom**
Location: Bellevue Hotel

Session Chair: Henry Lippard, ATI Specialty Metals

8:00 AM Introductory Comments

8:05 AM

Electrode Immersion Depth Influence in the ESR Process : an Experimental and Numerical Study: *Jeremy Chaulet*¹; Sylvain Charmond²; Bernard Dussoubs¹; Abdellah Kharicha³; Stéphane Hans²; Alain Jardy¹; ¹Institut Jean Lamour; ²Aubert & Duval; ³Christian Doppler Laboratory for Metallurgical Applications of MHD

8:30 AM

Validation of Electro-slag Remelting (ESR) Process Simulations for HAYNES®282® Alloy Slab Ingots: *Ram Krishnamurthy*¹; Michael Fahrman¹; ¹Haynes International

8:55 AM

Swing Control in ESR- Challenges, Influences and Outlook on a Key Control Parameter to Obtain Superior Ingots: *Manfred Ramprecht*¹; *Michael Kubin*¹; Alexander Scheriau¹; Harald Holzgruber¹; ¹INTECO melting and casting technologies GmbH

9:20 AM

Impact of Fill Factor on Electro-slag Remelting Operations: *Paul Jablonski*¹; Martin Detrois¹; ¹National Energy Technology Laboratory

9:45 AM

Modeling Electrochemical Effects on Electric Current Distribution in Electroslag Remelting (ESR) Process: *Ebrahim Karimi Sibaki*¹; Abdellah Kharicha¹; ¹Univ of Leoben

10:10 AM Break

10:35 AM

Effect of AC Frequency on Melting Conditions During Electroslag Remelting: *Brendan Connolly*¹; John Nauman¹; Evan Kendall¹; ¹Ellwood Quality Steels

11:00 AM

Slag Degassing for Electroslag Remelting using Cold Start: *Martin Detrois*¹; Paul Jablonski¹; ¹National Energy Technology Laboratory

11:25 AM Panel Discussion

Electoslag Refining II

Tuesday PM
September 20, 2022

Room: Grand Ballroom
Location: Bellevue Hotel

Session Chair: A. Jardy, Institut Jean Lamour

1:40 PM Introductory Comments

1:50 PM

Nitinol Electroslag Remelting: Initial Slag Study: *Kyle Fezi*¹; Paul Jablonski²; Martin Detrois²; Jeff Slater²; Beth Stehulak¹; ¹Fort Wayne Metals; ²National Energy Technology Laboratory

2:20 PM

Design of ESR Slags According to Requested Physical Properties. Part 4: Thermal Conductivity: *Krzysztof Wroblewski*¹; Piotr Wroblewski²; ¹Rowan University; ²Wroblewski Consulting

3:05 PM Break

Defects During Processing I

Tuesday PM
September 20, 2022

Room: Grand Ballroom
Location: Bellevue Hotel

Session Chair: K. Fezi, Fort Wayne Metals

3:30 PM

Elimination of Defects in Titanium Using PAM-CHR Melting: Neill McDonald¹; Emiliane Doridot²; Stephane Hans²; Jerome Delfosse³; Lea Decultot⁴; *Jean-Pierre Bellot*⁴; Alain Jardy⁴; ¹MetaFensch; ²Aubert & Duval; ³Safran Tech; ⁴Université de Lorraine - Institut Jean Lamour

3:55 PM

Effect of Solidification Condition on Sulfide Morphology in Free Machining Austenitic Stainless Steel: *Keiji Azuma*¹; Yoshinori Sumi¹; ¹Daido Steel Co., Ltd.

4:20 PM

Segregation of Impurities in Metallic Lithium Through Melt Settling: *Christian Bustillos*¹; Mihail Bora¹; Luke Thornley¹; Gabriella King¹; James Cahill¹; Joshua Kuntz¹; Wyatt Du Frane¹; ¹Lawrence Livermore National Laboratory

4:45 PM

Identifying Borides Inclusion in Aluminum Melt Using EDXRF for Small Spot Analysis: *Hussain Al Halwachi*¹; ¹Aluminium Bahrain (Alba)

Defects During Processing II

Wednesday AM
September 21, 2022

Room: Grand Ballroom
Location: Bellevue Hotel

Session Chair: A. Patel, Timet

8:00 AM Introductory Comments

8:05 AM

Dissolution of Al₂O₃, MgO-Al₂O₃ and SiO₂ in Alkali Oxide Containing Secondary Metallurgical Slags: Nikolaus Preisser¹; Julian Cejka¹; Shashank Babu¹; Gerald Klösch²; Susanne Michelie¹; ¹Christian Doppler Laboratory for Inclusion Metallurgy in Advanced Steelmaking; ²voestalpine Stahl Donawitz GmbH

8:30 AM

Characterization of the Inclusion-induced Surface Defects in Thin-gauge 1xxx, 3xxx and 5xxx Series Al-based Products: *Pascal Gauthier*¹; Mousa Javidani²; Tao Wang¹; ¹Rio Tinto; ²University of Quebec

8:55 AM

Kinetics of Oxygen Removal by Carbothermic Reduction from Steel Melts Under Vacuum Pressures: Andrew (Drew) Huck¹; Bryan Webber¹; Stephano Piva¹; ¹Carnegie Mellon University

9:20 AM

DANIELI Special Metallurgy, Introduction of a Key Player's New Product Line: *Matthias Knabl*¹; Harald Graf¹; Grygorii Sergiienko¹; Rolando Paolone²; Roberto Sorci³; ¹Danieli Engineering and Services GmbH; ²Danieli & C. Officine Meccaniche SPA; ³RINA Consulting

9:45 AM

Enhanced Material Properties in Advanced Air Casting Applications by Means of Vacuum Cap (VCAP) Furnace Process: Eike Schmilinsky¹; Inaki Vicario; Martin Myška¹; Roman Ritzenhoff; Thorsten Kutsch¹; s.rajudran²; *Aaron Teske*¹; ¹Consarc; ²Saraswathi Narayanan College

10:10 AM Break

10:35 AM

Investment Casting with Unique Levitation Melting Technology - FastCast: *Sergejs Spitans*¹; Christian Bauer¹; Henrik Franz¹; ¹ALD Vacuum Technologies GmbH

11:00 AM

Extension of Investment Casting Process Simulation by Electromagnetic Modelling of the Pre-process Step of Billet Induction Melting: Victoria Thomas¹; Ole Koeser²; *Steven Leyland*³; Stephen Brown¹; Nicholas Lavery¹; ¹Swansea University; ²Calcom ESI SA; ³Uni-Pol Group

11:25 AM

Final Chemical Composition Variations Due to the Effect of Different Power Input Rates During VIM Melting for Superalloy Investment Castings: *Oscar Caballero*¹; Jesus Mariano Arnesto¹; Daniel Bernal²; Pablo Garcia²; Xabier Chamorro²; Iñaki Hurtado²; Xabier Esquisabel²; Iñaki Madariaga³; ¹ITP Aero Castings; ²Mondragon GEP; ³ITP Aero

Other Processing

Wednesday PM
September 21, 2022

Room: Grand Ballroom
Location: Bellevue Hotel

Session Chair: M. Krane, Purdue University

1:20 PM Introductory Comments

1:25 PM

Development of an Acoustic Levitation Based Contactless Metrological Apparatus: Applications to Surface Tension and Viscosity Measurements of Low Melting Temperature Ga Droplets:

Herve Strozzyk¹; Thibault Quatravaux¹; Pierre Chapelle¹; Jonathan Martens¹; Julien Jourdan¹; ¹Institut Jean Lamour

1:50 PM

Segment Casting- a Semi-continuous Casting Technology for High-end Semi-finished Products Enters the Market: Stefano Baf¹; Oleksii Novokshonov¹; Harald Holzgruber¹; *Alexander Scheriau¹*; Klaus von Eynatten²; Michael Kubin¹; ¹INTECO melting and casting technologies GmbH; ²Eycon-steel plant technology

2:15 PM

Comparison of the Degassing Efficiency for Different Injector Types: *Moritz Eickhoff¹*; Tim Haas¹; Herbert Pfeifer¹; ¹RWTH Aachen University

2:40 PM

Discrete Liquid Flow in a Random Packed Bed with Implications to Iron Making Blast Furnace: *Venkat Arunchaitanya¹*; Govind S Gupta¹; ¹Indian Institute of Science

A		G		N	
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F		Michelic, S.	4		
Fahrman, M.	3	Mitchell, A.	3		
Fezi, K.	3, 4	Motley, J.	3		
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