

Sheet Metal Welding Conference XIX

Agenda

Tuesday – November 2, 2021

Session 1 – Conference Keynotes

Session Leader: Warren Peterson (United Technical)

8:00-8:30 Registration
 8:30-8:45 Opening Remarks – Warren Peterson (United Technical) Conference Chairman

Time	Title	Speaker(s)
8:45-9:15	Design Architectures for Electric Vehicles	B. Michajlyszyn (Rivian)
9:15-9:45	GM Hummer EV	W. Parsons (GM)
9:45-10:00	Break	

Session 2A – Resistance Welding AHSS and LME

Session Leader: Murali Tumuluru (Tumuluru Welding)

Time	Paper No.	Title [Author(s)]
10:00-10:30	2A-1	Rapid Characterization of LME Activation Temperature for Zin-Coated Sheet Steels [M. J. Karagoulis*, Z. Teng (<i>GM/Retired*</i>)]
10:30-11:00	2A-2	AHSS Resistance Spot Welding DOE for Analysis of Cracking Propensity [B. Trojanowski (<i>FCA Automobiles</i>)]
11:00-11:30	2A-3	Nondestructive Detection and Characterization of LME Cracks in Resistance Spot Welds of Zn-Coated Advanced High-Strength Steel [H. Ghassemi-Armaki ¹ , S. Yaacoubi ² , F. Dahmene ² , M. El Mountassir ² , A. E. Bouzenad ² , P. Rabaey ² , M. Masmoudi ² , P. Nennig ² , T. Dupuy ¹ , Y. Benlatreche ¹ , A. Taram ¹ (<i>ArcelorMittal Global R&D¹, Institut de Soudure²</i>)]
11:30-1:00	Lunch	

Session 2B – Electric Vehicle Battery and Arc Welding

Session Leader: Mike Palko (Ford)

Time	Paper No.	Title [Author(s)]
10:00-10:30	2B-1	Exploring Interlayer Materials for the Improvement of Resistance Spot Welding of Aluminum to AHSS [R. Giorjao ¹ , B. Lara ¹ , T. Abke ² , H. Ghassemi-Armaki ³ , W. Trojanowski ⁴ , A. Ramirez ¹ (<i>OSU¹, Honda², ArcelorMitta³, FCA Metallic Materials⁴</i>)]
10:30-11:00	2B-2	Copper Foil and Aluminum Foil Welding for Battery Manufacturing [T. Frech, K. Namola, J. Gould (<i>EWI</i>)]
11:00-11:30	2B-3	Pulsed-Arc Welding of Battery Tabs for Vehicle Electrification [T. Frech, J. Tran, K. Namola (<i>EWI</i>)]
11:30-1:00	Lunch	

Session 2A –Resistance Welding AHSS and LME

Time	Paper No.	Title [Author(s)]
1:00-1:30	2A-4	Comparative Analysis of Liquid Metal Embrittlement Reduction Methods in Zinc-Coated Third-Generation Advanced High-Strength Steels [B. Barber, C. DiGiovanni, M. Shojaee, A. Midawi, E. Biro (<i>University of Waterloo</i>)]
1:30-2:00	2A-5	Subcritical Liquid Metal Embrittlement in AHSS – When it Occurs and Why it is Not Commonly Reported [C. Digiovanni, E. Biro, N. Y. Zhou (<i>University of Waterloo</i>)]
2:00-2:30	2A-6	Influence of Heating Time on the Liquid Metal Embrittlement Sensitivity of a Candidate Generation III Sheet Steel [J. E. Gould, L. Amanuel (<i>EWI</i>)]
2:30-2:45	Break	
2:45-3:15	2A-7	An Investigation into the Influences of LME Cracks on the Joint Strength of Resistance Spot Welding using the X-Ray CT Scan [Y. Yo, K. Maeda, R. Suzuki (<i>Kobe Steel</i>)]
3:15-3:45	2A-8	Improving the Weldability of Thick Rich Chemistry Advanced High-Strength Steel to Thin Interstitial-Free GI Steel [M. Gugel (<i>U.S. Steel</i>)]
3:45-4:15	2A-9	Comparing Different LME Weld Test on Advanced High-Strength Steels [R. H. Wolf (<i>U.S. Steel</i>)]
4:15	Adjourn	

Session 2B – Electric Vehicle Battery and Arc Welding

Time	Paper No.	Title [Author(s)]
1:00-1:30	2B-4	Laser-MIG-Hybrid Welding of Automotive Battery Housings – A Concept Study Involving Practical Weld Results [S. A. Egerland (<i>Fronius International</i>)]
1:30-2:00	2B-5	Predicting Failure for Arc-Welded Sheet Steel in Automotive Crash Structure [W. Mohr, A. Moghaddas (<i>EWI</i>)]
2:00-2:30	2B-6	Practical, High-Strength, Solid-State Welding of Advanced and Dissimilar Alloys: Vaporizing Foil Actuator Welding [G. S. Daehn ^{1,2} , B. T. Thurston ¹ , Y. Mao ¹ , A. Kapil ³ , E. Mayton ^{1,2} (<i>OSU¹, Applied Impulse², Welding Technology³</i>)]
2:30-2:45	Break	
2:45-3:15	2B-7	Welding Simulation and Validation for Automotive Applications [W. Cai ¹ , M. Saez ¹ , P. Spicer ¹ , B. Carlson ¹ , F. Okigami ² , J. Robertson ² (<i>GM¹, MSC Software²</i>)]
3:15-3:45	2B-8	SEP-1220-5 GMAW Test Procedure Inconsistencies Applied to High-Strength Low-Alloy Steel [J. M. Torres and E. Pakalins (<i>R&E Engineering Services</i>)]
3:45-4:15	2B-9	Effect of Gravity on the Weld Pool Cross Sections in Butt Joints Investigated Both by Factor Analysis and Inverse Heat Conduction Calculations [D. L. Rosen ¹ , S. G. Lambrakos ² (<i>Retired Army Scientist¹, U.S. NRL²</i>)]
4:15	Adjourn	

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Wednesday – November 3, 2021

Session 3A – Resistance Welding

Session Leader: Michael Karagoulis (GM-Retired)

Time	Paper No.	Title [Author(s)]
8:30-9:00	3A-1	Quantitative Nondestructive Sizing of Resistance Spot Weld Nuggets [J. K. Na (<i>KBRwyle</i>)]
9:00-9:30	3A-2	The Fusion Boundary, a Potential Failure Path in the Resistance Spot Welding of Q&P Steels [D. C. Ramachandran ¹ , B. D. Nascimento Figuerdo ¹ , A. Macwan ² , E. Biro ¹ (<i>University of Waterloo</i> , <i>ArcelorMittal Global Research</i> ²)]
9:30-10:00	3A-3	Impact of Heat Treatment Conditions on Spot Weldability of Usibor® 1500-AS and Ductibor® 1000-AS [Z. Wang, A. Chiocca (<i>ArcelorMittal</i>)]
10:00-10:15	Break	
10:15-10:45	3A-4	A Study on Improving the Mechanical Performance by Controlling the Halo Ring in the Q&P Steel Resistance Spot Welds [D. C. Ramachandran ¹ , B. D. Nascimento Figuerdo ¹ , A. Macwan ² , E. Biro ¹ (<i>University of Waterloo</i> , <i>ArcelorMittal Global Research</i> ²)]
10:45-11:15	3A-5	The Welding Parameters' Influence on the Resistance of Spot Welds on Patch-Welded Blanks after Hot Stamping with and without Heat Treatment [J. A. Lara, L. Abbade, J. L. Rossi, C. S. Musci (<i>Instituto de Pesquisas Energeticas e Nucleares</i>)]
11:15-11:45	3A-6	Industrially Viable Methods to Reduce Liquid Metal Embrittlement Severity in Resistance Spot-Welded Third-Generation Advanced High-Strength Steels [K. Pearson ¹ , B. Barber ¹ , M. Shojaei ¹ , A.R.H. Midawi ¹ , H. Ghassemi-Armaki ² , E. Biro ¹ (<i>University of Waterloo</i> , <i>ArcelorMittal Global R&D</i> ²)]
11:45-1:00	Lunch	

Session 3B – Alternative Joining Methods

Session Leader: Andrea Orr (Ford)

Time	Paper No.	Title [Author(s)]
8:30-9:00	3B-1	Laser Ultrasound Wave Propagation in Multi-Layer Laser-Welded Joints and Implications on Substrate Interface Defect Detection [V. Gattani, M. McGovern, D. Bruder, T. Rinker (<i>GM</i>)]
9:00-9:30	3B-2	Application-Oriented Element Welding Technologies for Flexible Light-Weight BIW Mass-Production [V. Janzen ¹ , E. Kortes ² (<i>Arnold Umformtechnik</i> ¹ , <i>Arnold Fastening Systems</i> ²)]
9:30-10:00	3B-3	Experimental Analysis on Ultrasonic Resistance Spot Welding Process for Aluminum Alloys [U. Shah, X. Liu (<i>OSU</i>)]
10:00-10:15	Break	
10:15-10:45	3B-4	Unique Forge Welding Process to Join Aluminum-Laminated Sheet to Weld Plugs [M. Telenko ¹ , W. Peterson ² (<i>Shiloh</i> ¹ , <i>United Technical</i> ²)]
10:45-11:15	3B-5	Capacitor Discharge Spot Welding of Al: Part 1- Weldability Assessments [J. E. Gould ¹ , L. Lindamood ¹ , J. Malpica ² , P. Lester ² , D. Zhu ² (<i>EWI</i> ¹ , <i>Novelis</i> ²)]
11:15-11:45	3B-6	Capacitor Discharge Spot Welding of Al: Part 2- Electrode Life Assessments [J. E. Gould ¹ , L. Lindamood ¹ , J. Malpica ² , P. Lester ² , D. Zhu ² (<i>EWI</i> ¹ , <i>Novelis</i> ²)]
11:45-1:00	Lunch	

Session 4A – Resistance Welding Al and Dissimilar Materials

Session Leader: Elliot Biro (University of Waterloo)

Time	Paper No.	Title [Author(s)]
1:00-1:30	4A-1	Strategies for Mitigating Electrode Wear in Aluminum RSW [J. Malpica, P. Lester (<i>Novelis</i>)]
1:30-2:00	4A-2	Dissimilar Resistance Welding of Aluminum to Steel using Electrospray Deposition Interlayers [K. Chan ¹ , C. Li ² , N. Y. Zhou ¹ (<i>University of Waterloo</i> ¹ , <i>Huys Industries</i> ²)]
2:00-2:30	4A-3	Experimental and Numerical Analysis of Ultrasonic Effects on the Contact Resistance during Resistance Spot Welding Process [U. Shah, X. Liu, W. Zhang, A. Benetar (<i>OSU</i>)]
2:30-2:45	Break	
2:45-3:15	4A-4	Investigating the Use of Interlayer Technology to Resistance Spot Weld Advanced Materials for the Automotive Industry [L. Amanuel, B. Lara, R. Giorjao, A. Ramirez (<i>OSU</i>)]
3:15-3:45	4A-5	Process, Microstructure, and Fracture Mode of Thick Stack-Ups of Aluminum Alloy to AHSS Dissimilar Metal Spot Joints [L. Walker, C. Hilla, M. Kimchi, W. Zhang (<i>OSU</i>)]
3:45-4:15	4A-6	Effects of Spot-Welding Parameters on Electrode Sticking of Thin Aluminum Sheets [Z. Teng, M. Karagoulis*, Jason Brown (<i>GM/Retired*</i>)]
4:15	Vendor Display	

Session 4B – Laser Welding

Session Leader: Mark Gugel (US Steel)

Time	Paper No.	Title [Author(s)]
1:00-1:30	4B-1	Laser Process Modification to Reduce Crater Crack in Zn-Coated 3 rd Gen. AHSS [H. Ghassemi-Armaki ¹ , E. Zuniga ² , J. Hover ² , G. Huang ¹ , S. Sadagopan ¹ (<i>ArcelorMittal</i> ¹ , <i>Ford</i> ²)]
1:30-2:00	4B-2	Laser Beam Welding of Copper Alloys [C. Bratt, E. Karim, A. Abdulkadir (<i>Fraunhofer USA</i>)]
2:00-2:30	4B-3	Evaluation of Diode Laser Post-Weld Heat-Treated DP 1000 Butt-Welded Laser Joint [R.P.S. Sisodia, M. Gaspar (<i>University of Miskolc</i>)]
2:30-2:45	Break	
2:45-3:15	4B-4	Improvement of Delayed Cracking in Laser Weld of 980GEN3 Steels [C. Jiang, L. Jiang, K. Kram (<i>AET Integration</i>)]
3:15-3:45	4B-5	The Impact of Laser Impingement Angle on Process Stability and Weld Geometry During High-Speed Laser Welding of Automotive Steels [M. S. Khan, D. Westerbaan, W. Duley, E. Biro, N. Y. Zhou (<i>University of Waterloo</i>)]
3:45-4:15	4B-6	Advancements in Remote Laser Beam Positioning, Pattern Recognition, and 6D Seam Tracking [J. Sutter (<i>Abicor Binzel</i>)]
4:15	Vendor Display	

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Thursday – November 4, 2021

Session 5A – Other Joining Processes

Session Leader: Zhenke Teng (GM)

Time	Paper No.	Title [Author(s)]
8:30-9:00	5A-1	Friction Stir Welding Spectral Defect Detection [J. Hunt, Y. Hovanski, B. Mazzeo (<i>Brigham Young University</i>)]
9:00-9:30	5A-2	Advances in Refill Friction Stir Spot Welding Productivity [Y. Hovanski, B. Larsen, A. Curtis (<i>Brigham Young University</i>)]
9:30-10:00	5A-3	Influence of Laser Welding Process Parameters on the Microstructure of UNS S32205 [S. Ulrich, S. Jahn (<i>Günter-Köhler-Institut für Fügetechnik und Werkstoffprüfung</i>)]
10:00-10:15	Break	
10:15-10:45	5A-4	Adhesives for Automotive Applications [J. Ellis (<i>EWI</i>)]
10:45-11:15	5A-5	Advancements in GMAW Technology for Zinc-Coated Steels [T. Dittrich, K. Fleming (<i>The Lincoln Electric Company</i>)]
11:15-11:45	5A-6	Influence of Surface Treatment on Joint Strength During MIG Brazing of GI- and GA-Coated DP 600 [Y.-H. Cho ¹ , M. S. Khan ¹ , B. W. Klassen ¹ , F. Goodwin ² , Y. Zhou ¹ (<i>University of Waterloo¹, International Zinc Association²</i>)]
11:45-1:00	Final Comments/Adjourn	

Session 5B – Emerging Technologies

Session Leader: Menachem Kimchi (OSU)

Time	Paper No.	Title [Author(s)]
8:30-9:00	5B-1	Contact-Free Ultrasonic Testing for Robot-Automated Spot Weld Inspection [J. Pörnbacher, W. Rohringer, B. Fisher (<i>Xarion Laser Acoustics GmbH</i>)]
9:00-9:30	5B-2	Robotic Weld Scanning for Automated Management and Control of Welding Quality [J. Noruk (<i>Servo-Robot</i>)]
9:30-10:00	5B-3	Fusion Welding of Aluminum Additively Manufactured Components [A. Orr, J. A. Clarke, E. Hetrick (<i>Ford</i>)]
10:00-10:15	Break	
10:15-10:45	5B-4	Virtual Resistance Spot Welding, Pull-Testing Methodology, and Experimental Validation [J. Robertson ¹ , F. Okigami ² (<i>MSC Software¹, TekniCAE²</i>)]
10:45-11:15	5B-5	Effect of Loading Mode on Mechanical Properties and Failure Behavior of Resistance Spot-Welded Third-Generation Advanced High-Strength Steels [M. Shojae ¹ , K. E. Pearson ¹ , C. Tolton ¹ , A.R.H. Midawi ¹ , H. Ghassemi-Armaki ² , M. Worswick ¹ , E. Biro ¹ (<i>University of Waterloo¹, ArcelorMittal²</i>)]
11:15-11:45	5B-6	A Novel Welding Solution Technology for Stamping Processes [V. Anh Nguyen ¹ , H. Seongming ² , N. Huu Manh ³ , A. Murata ¹ , D. Hai Tinh ⁴ , L. Thu Quy ⁴ , S. Tashiro ² , M. Tanaka ² (<i>Murata Welding Laboratory¹, Osaka University², Sao Do University³, National Key Laboratory for Welding & Surface Treatment Technologies⁴</i>)]
11:45-1:00	Final Comments/Adjourn	