

COMMISSION



**International Institute of Welding**

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**Commission III**

**Resistance Welding and Allied Processes**

**Friction-Based Processes**

**Solid-State Additive Manufacturing**

Chair: Prof. Dr. Hee Seok Chang (Republic of Korea)  
 Vice-Chair: Prof. Pedro Vilaça (Finland)  
 Sub-Commission III-A: Resistance Welding and Allied Processes  
 Chair: Prof. Elliot Biro (Canada), Dr. Murali Tumuluru (USA)  
 Sub-Commission III-B: Friction Based Processes  
 Chair: Prof. Wenya Li (China), Prof. Pedro Vilaça (Finland)  
 Sub-Commission III-C: Solid-State Additive Manufacturing  
 Chair: Prof. Dr. Jorge F. Dos Santos  
 Secretary: Dr. Zygmunt Mikno (Poland)

**Commission III 2024 Annual Assembly PROGRAMME**

**Venue: Rodos Palace Hotel, Rodos Island, Greece**

**Date: 7 to 12, July, 2024**

Sunday, 7th July 2024 (Day 0)			
Opening Session Commission III Chair: Dr. Jorge F. Dos Santos (USA), Prof. Hee Seok Chang (Republic of Korea)			
Time Slots	Title, Authors and Delegation		IIW Document Number III-xxxx-24
Central European Summer Time (CEST)			
13:30	14:00	Registration and Check in	<b>M</b> denotes full paper
14:00	14:30	Welding parameters/ electrode surface patterning influence on quality in resistance spot welding of aluminum alloy Changwook Ji*1, Jaehun Kim 1 1 Smart Forming Process R&D Group, Korea Institute of Industrial Technology, Republic of Korea	<b>2280</b> <b>M</b>
14:30	15:00	Development of friction stir welding of aluminium alloys and steels for innovative applications in plant and vessel construction by Prof. Dr. Heidi Cramer*, GSI – Gesellschaft für Schweißtechnik International mbH R. Boywitt, GSI – Gesellschaft für Schweißtechnik International mbH, Niederlassung SLV Berlin-Brandenburg, Germany	2281
15:00	15:30	Process Envelope in FSW: Survey, Experiments, and classification of Defects by Gerlich A2 , Xinrui Liu1 , Patricio Mendez*1 1 University of Alberta, Edmonton Alberta, Canada , 2 University of Waterloo, Waterloo Ontario, Canada	2278
15:30	16:00	Effect of a variable electrode force on the LME crack formation during resistance spot welding of 3G AHSS by Moritz Ullrich* and Sven Jüttner Otto-von-Guericke-University Magdeburg, Institute of Materials and Joining Technology,Universitätsplatz 2, 39106 Magdeburg, Germany	<b>2227</b> <b>M</b>
16:00	16:30	Convection and joint characteristics in aluminum alloy melting zone during resistance spot welding of dissimilar Fe-Al material in external magnetic field by Muneyoshi Iyota1*, Yuta Funabiki1, Takahisa Shobu2, Tomoki Matsuda3, Yujiro Hayashi4 and Tomokazu Sano3 1 Osaka Institute of Technology 2 Japan Atomic Energy Agency 3 Osaka University 4 RIKEN , Japan	2240
16:30	16:45	Coffee Break	
16:45	17:10	Prediction of splash and LME based on dynamic resistance curves by He Gao*, Tony Erenst, Tony van der Veldt Tata Steel Nederland, Netherlands	<b>2235</b> <b>M</b>

17:10	17:35	The influence of the upslope time of the welding current on the projection welding process and the quality of welded joints by Mariusz Stepień 1 and Zygmunt Mikno* 2 1 Silesian University of Technology, ul. B. Krzywoustego 2, 44-100 Gliwice, Poland 2 Lukaszewicz – GIT Center of Welding, ul. Bl. Czesława 16-18, 44-100 Gliwice, Poland	2220
17:35	18:00	Solid State Resistance Spot Joining of High Tensile Strength Steel by Takaaki MIYAUCHI* 1, Shinichi HASEGAWA 1, Yoshiaki MORISADA 2, Hidetoshi FUJII 2 1 OTC Daihen Corporation, Kobe, Hyogo, Japan 2 JWRI, Osaka University, Ibaraki, Osaka, Japan	2246
<b>Adjourn - Continues on the 8th July</b>			

<b>Monday, 8th July 2024 (Day 1)</b>			
Opening Session Commission III Chair: Dr. Murali Tumuluru (USA), Prof. Elliot Biro (Canada)			
Time Slots		Title, Authors and Delegation	IIW Document Number III-xxxx-24
Central European Summer Time (CEST)			
7:40	8:00	Registration and Check in	<b>M</b> denotes full paper
8:00	8:10	Welcome and Introduction, Report on IIW 2024 Intermediate Meeting Plenary session dealing with administrative issues of Commission III	2216
8:10	8:35	<b>Invited Speech C-III-C;</b> Application of high-velocity friction riveting to automotive structures by Md. Reza-E-Rabby, L. Li, A. Nittala, M. Pole, L. Li, K. Balusu, J.F. dos Santos* Energy and Environment Directorate, Applied Materials & Manufacturing, Pacific Northwest National Laboratory (PNNL), USA	2249
8:35	9:00	<b>Invited Speech C-III-B;</b> Thermo-mechanical processes in the zones of thin sheet magnesium alloy FSW butt joints by Maksym Khokhlov*, Makhnenko O., Kostin V., Pokliatskiy A., Falchenko Iu., Khokhlova J. E.O. Paton Electric Welding Institute, Ukraine	<b>2275</b> <b>M</b>
9:00	9:25	<b>Invited Speech C-III-A;</b> Acoustic process monitoring during projection welding using airborne sound analysis and machine learning by Johannes Koal*, Martin Baumgarten, Cedric Nikolov, Sreeram Ramakrishnan, Christian Mathiszik, Hans Christian Schmale, *Chair of Joining Technology and Assembly, Institute of Manufacturing, Technische Universität Dresden, Dresden, Germany	<b>2238</b> <b>M</b>
9:25	9:50	Research on Corrosion Fatigue Property of Steel/Aluminum Alloy Weld-Bonded Lap Joint in High Temperature and High Humidity by Hisashi SERIZAWA*, Joining and Welding Research Institute, Osaka University, 11-1 Mihogaoka, Ibaraki, Osaka 567-0047, Japan	<b>2244</b> <b>M</b>
9:50	10:15	Effect of Paint Baking on Weld Strength and Fracture Behavior in Resistance Spot Welds of Advanced High Strength Steels by Hyeon-Jeong Shin*, Sang-Ho Uhm and Du-Youl Choi Welding & Joining Research Group / Steel Solution Research Lab. POSCO, Incheon, Republic of Korea	2234
Symposium on Solid-State Additive Manufacturing (Sub-Commission III-C) Chair: Dr. Jorge F. Dos Santos (USA)			
10:15	10:45	Friction stir welding of additively manufactured A20X aluminum alloy by Abankar M , De Maddis M , Lombardi F Lunetto V and Russo Spena P*, Department of Management and Production Engineering, Politecnico Di Torino, Torino, Italy	2250
10:45	11:15	Coffee Break	
11:15	11:45	Controlled and Highly Efficient Additive Processing (CHEAP) for aluminum alloy via ring-jig by Fuyuki Ishida*, Takayuki Yamashita, Masayoshi Kamai, Yoshiaki Morisada, and Hidetoshi Fujii, Joining and Welding Research Institute, Osaka University, Japan	2245

11:45	12:15	Effect of Ambient Conditions in Friction Surfacing by Aspes P 1, Duda E 1-2, Marius Hoffmann* 1, Klusemann B 1-3 1 Helmholtz-Zentrum Hereon, Institute of Material and Process Design, Solid State Materials Processing, Geesthacht, Germany 2 Laboratório de Metalurgia Física, LAMEF, Universidade Federal do Rio Grande do Sul, UFRGS, Porto Alegre, Brazil 3 Leuphana University of Lüneburg, Institute for Production Technology and Systems, Lüneburg, Germany	2259 M
12:15	12:45	Wire-Based Friction Stir Additive Remanufacturing towards Field Repairing by Xiangchen Meng* , State Key Laboratory of Precision Welding & Joining of Materials and Structures, Harbin Institute of Technology, Harbin, Heilongjiang, China	2271
12:45	14:25	Lunch Break	
Symposium on Friction Based Processes (Sub-Commission III-B) Chair: Prof. Wenya Li (China), Dr. Jorge F. Dos Santos (USA)			
14:25	14:50	Ultrasonic suppression on intermetallic compounds formation in friction stir welding of dissimilar Mg/Al alloys by Jie Liu, Lei Shi and ChuanSong Wu * Institute of Materials Joining, Shandong University, Jinan, China	2221
14:50	15:15	Structural Reinforcement using FSW in T-Joint Configuration, correlation between parameters and Properties by Luciano Bergmann* 1 , Bernardi M 1 , Grassel S 1 , Klusemann B 1 1 Helmholtz-Zentrum Hereon 2 Leuphana University Lüneburg, Institute for Production Technology and Systems, Lüneburg, Germany	2269
15:15	15:40	Effect of AISI coating on weldability of dissimilar Al/Press-hardening steel joints using refill friction stir spot welding by Chen T 1 , Fu B 1 , Benjamin Klusemann* 1,2 , Shen T 1 , Suhuddin U 1 1 Helmholtz-Zentrum Hereon, Geesthacht, Germany, 2 Leuphana University Lüneburg, Lüneburg, Germany	2264
15:40	16:10	Friction stir lap joining of 3T aluminum sheets in Robotic Platform by Hrishikesh Das, Shivakant Shukla, Mitch Blocher, Piyush Upadhyay, Applied Materials & Manufacturing, Energy and Environment Directorate, Pacific Northwest National Laboratory (PNNL), USA	2248
16:10	16:45	Coffee Break	
16:45	17:10	Mechanical and solid-state hybrid joining of high-specific strength alloys by novel friction self-piercing riveting process by Yunwu Ma1, and Yongbing Li*2, 1 State Key Laboratory of Mechanical System and Vibration 2 Shanghai Key Laboratory of Digital Manufacture for Thin-walled Structures, Shanghai Jiao Tong University, Shanghai, China	2230
17:10	17:35	Synergistically double-sided friction stir welding of 6061 aluminum alloy by Li Wenya 1* , Tang Y 1 , Wang W 2 , Zou Y 1 1 Northwestern Polytechnical University, Xi'an Shaanxi Province, China 2 Beijing Solidwel Intelligent Technology Co., Ltd, Beijing, China	2225
17:35	18:00	<b>IIW Administrative Orientation : IIW Secretariat, Dr. Elisabetta Sciacaluga</b> <b>Welding in the World update : Dr. Americo Scotti</b>	
<b>Adjourn - Continues on the 9th July</b>			

<b>Tuesday, 9th July 2024 (Day 2)</b>			
Symposium on Fatigue Phenomena in RSW and FSW processes Chair: Prof. Elliot Biro (Canada), Prof. Wenya Li (China)			
<b>Time Slots</b>		<b>Title, Authors and Delegation</b>	<b>IIW Document Number III-xxxx-24</b>
<b>Central European Summer Time (CEST)</b>			
8:00	8:10	Registration and Check in	<b>M denotes full paper</b>
8:10	8:35	Comparison of the high cycle fatigue behaviour of aluminium/steel clinched and resistance spot welded joints by Kovacs P , Lukacs J , Akos Meilinger* , University of Miskolc, Miskolc, Hungary	<b>2260 M</b>

8:35	9:00	Liquid Metal Embrittlement in Resistance Spot Welding and solution for automotive steels by Ming Lei*, Research Institute, Baosteel Iron & Steel Co. Ltd., State Key Laboratory of Development and Application Technology of Automotive Steels, Shanghai, China	2228
9:00	9:25	Fatigue Life Assessment of Refill Friction Stir Spot Welded and Mechanically Fastened AA7075-T6 and Laser Powder Bed Fusion Printed AlSi10Mg Single-Lap Joints by Amancio-Filho S 1 , Arbelo M 3 , Chaves C 4 , Draper J 2 , Sebastian Fritsche* 1 , Galloway A 2 , Toumpis A 2 1 Graz University of Technology, Institute of Materials Science, Joining and Forming, Graz, Austria 2 University of Strathclyde, Department of Mechanical & Aerospace Engineering, Glasgow, United Kingdom 3 Aeronautics Institute of Technology, Laboratory of Aerospace Structures, Sao Jose dos Campos, Brazil 4 Embraer SA, Sao Jose dos Campos, Brazil	2276
Symposium on Modeling, Simulation and Optimization in RSW/FSW processes Chair: Prof. Hee Seok Chang (Republic of Korea), Dr. Murali Tumuluru (USA)			
9:25	9:50	Real Time simulation of resistance spot welding with surrogate modelling by Johannes Koal*1, Martin Baumgarten1, Erik Marr1, Hans Christian Schmale1, 1 Technische Universität Dresden, Institute of Manufacturing, Chair of Joining Technology and Assembly, Germany	2237
9:50	10:15	Determining the Physical Mechanisms of Resistance Projection Welding Incorporating Case Hardened Parts by Simulation by Martin Baumgarten*, Johannes Koal, Hans Christian Schmale Chair of Joining Technology and Assembly, Institute of Manufacturing Science and Engineering, Technische Universität Dresden, Germany	<b>2224</b> <b>M</b>
10:15	10:45	Numerical modelling as a predictive tool to reduce defects in refill friction stir spot welded joints by Amancio-Filho S 2 , Jonathan Draper* 1 , Fritsche S 2 , Galloway A 1 , Toumpis A 1 1 University Of Strathclyde, Glasgow, United Kingdom 2 Graz University of Technology, Graz, Austria	2257
10:45	11:15	Coffee Break	
11:15	11:40	Optimized Friction Stir Welding Mathematical Model: A Scaling Analysis of Heat Transfer and Plastic Deformation by Mendez P , Sofia Salazar* University of Alberta, Edmonton Alberta, Canada	2277
11:40	12:05	Resistance spot welding of die-cast and wrought aluminum alloys: Improving weld spot quality through parameter optimization by Maike Epperlein*, Dr.-Ing. Alexander Schiebahn, Univ.-Prof. Dr.-Ing. Uwe Reisgen RWTH Aachen University, Welding and Joining Institute (ISF), Germany	<b>2223</b> <b>M</b>
Symposium on Linear Friction Welding Chair: Dr. Jorge F. Dos Santos (USA), Prof. Wenya Li (China)			
12:05	12:30	Novel Dissimilar Joining of AA7075 Aluminum and SS400 Steel utilizing Center-Driven Double-Sided Linear Friction Welding (CDDS-LFW) with Mild Steel Center Material by Furkan KHAN*, Takuya MIURA, Yoshiaki MORISADA, Kohsaku USHIODA, Hidetoshi FUJII, Joining and Welding Research Institute, Osaka University, Japan	2241
12:30	13:00	Microstructures and mechanical properties of low-temperature linear friction welded near $\beta$ Ti-17 alloy joint by Natsumi Kinouchi*, Yasuhiro Aokia, Kohsaku Ushiodaa, Masaaki Nakaib and Hidetoshi Fujia a Joining and Welding Research Institutur, Osaka University, Ibaragi, Osaka, Japan b Dept. of Mechanical Engng, Faculty of Science and Engineering, Kindai University, Higashiosaka, Osaka, Japan	2242
13:00	14:25	Lunch Break	
14:25	14:50	Evaluation of interface heating characteristics of LFW process by moving particle method by T.Kikugawa, F.Miyasaka, T.Kitamura, Towa KIKUGAWA*, Osaka University, Japan	2247
Symposium on Corrosion Analysis in FSW processes Chair: Dr. Jorge F Dos Santos (USA), Prof. Wenya Li (China)			
14:50	15:15	Study of microstructure characteristics and corrosion behavior of dissimilar aluminum alloy RFSSW joint by Da Zhang*, Northwestern Polytechnical University, Xi'an, China	2254

15:15	15:40	Ultra-strong Interface Covalent Bonding between TC4 and Non-polar UHMWPE via Metal Surface Amorphization and Polymer In-situ Functionalization by Ke Chen <sup>1, 2*</sup> , Xin Zou <sup>1, 2, 3</sup> , Wei Zhou <sup>3</sup> , Min Wang <sup>1, 2</sup> 1- Shanghai Key Laboratory of Materials Laser Processing and Modification, Shanghai Jiao Tong University, No. 800, Dong Chuan Road, Shanghai, 200240, P.R. China 2- School of Materials Science and Engineering, Shanghai Jiao Tong University, No. 800, Dong Chuan Road, Shanghai, 200240, P.R. China 3- Singapore Centre for 3D Printing, School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, 639798, Singapore	2233
15:40	16:05	In-situ rolling friction stir welding of high-strength aluminum alloys towards stress corrosion resistance by Huang Y, Wei Wang* , State Key Laboratory of Precision Welding & Joining of Materials and Structures, Harbin Institute of Technology, Harbin, Heilongjiang, China	2272
16:05	16:45	Coffee Break	
16:45	17:10	Recent progress on friction stir channeling for cold plates by Yuming Xie* , State Key Laboratory of Precision Welding & Joining of Materials and Structures, Harbin Institute of Technology, Harbin, Heilongjiang, China	2270
<b>Adjourn- Continues on the 10th July</b>			

### Wednesday, 10th July 2024 (Day 3)

Symposium on Ultrasonic Metal Welding  
Chair: Dr. Murali Tumuluru (USA), Prof. Elliot Biro (Canada)

Time Slots		Title, Authors and Delegation	IIW Document Number III-xxxx-24
Central European Summer Time (CEST)			
8:00	8:10	Registration and Check in	<b>M</b> denotes full paper
8:10	8:35	Laser-based surface pretreatment for ultrasonic metal welding of copper and dissimilar aluminium-copper joints by E. Helfers* <sup>1</sup> , F.W. Müller <sup>1</sup> , A. Schiebahn <sup>1</sup> , U. Reisgen <sup>1</sup> 1Welding and Joining Institute (ISF), RWTH Aachen University, Pontstraße 49, 52062 Aachen, Germany	<b>2217</b> <b>M</b>
8:35	9:00	Influence of quality features, disturbances, sensor data and measurement time on quality prediction for ultrasonic metal welding by Florian W. Müller* <sup>1</sup> , Christian Mirzb <sup>2</sup> , Alexander Schiebahn <sup>1</sup> , Uwe Reisgen <sup>1</sup> 1 RWTH Aachen University – Welding and Joining Institute, Aachen, Germany 2 RWTH Aachen University – Institute of Mechanism Theory, Machine Dynamics and Robotics, Aachen, Germany	<b>2219</b> <b>M</b>
9:00	9:25	Novel approach for in-line process monitoring during ultrasonic metal welding of dissimilar wire/terminal joints based on the thermoelectric effect by Andreas Gester* <sup>1</sup> , Toni Sprigode <sup>1</sup> , Guntram Wagner <sup>1</sup> 1Chair of Composites and Material Compounds, Chemnitz University of Technology, Chemnitz, Germany	<b>2236</b> <b>M</b>
9:25	9:50	EBSD study of the texture and grain deformation in NiTi with a Cu interlayer ultrasonic spot welding joints under cyclic tension by Zhiyuan Xu* , Zhang Y, Shanghai Key Laboratory of Digital Manufacture for Thin-Walled Structures, Shanghai Jiao Tong University, Shanghai, China	2273
9:50	10:15	The Effect Mechanism of Ultrasonic Vibration on Aluminum/Steel Resistance Spot Welding Process by REN B <sup>1</sup> , Kang Zhou* <sup>1</sup> 1 Beijing institute of technology, Beijing Beijing, China	2266
Symposium on Electrode Wear in RSW and Tool Technology for FSW Chair: Dr. Murali Tumuluru (USA), Prof. Wenya Li (China)			

10:15	10:40	Advancements in Evaluating Electrode Wear in Resistance Spot Welding of Aluminium Alloys by Stefan Heilmann*1, Marcel Merx2, Martin Baumgarten1, Jens Müller2, Steffen Ihlenfeldt2, Uwe Füssel1, Hans Christian Schmale1 1Technische Universität Dresden, Institute of Manufacturing , Chair of Joining Technology and Assembly 2Technische Universität Dresden, Institute of Mechatronic Engineering, Chair of Machine Tools Development and Adaptive Controls, Germany	2222
10:40	11:15	Coffee Break	
11:15	11:40	Characteristics parameters and feature extraction for assessment of tool life in multi-pulse resistance spot welding of primary coated steels by Arora K 1 , Bag S L . , Asati Brajesh* 1 , Kumar A L . , Shajan N 1 Materials Welding & Joining Research Group, Tata Steel Limited, Jamshedpur 831007 Jharkhand, India 2 Department of Mechanical Engineering, IIT Guwahati, Guwahati 781039 Assam, India	2255 M
11:40	12:05	Correlation between Electrodes Surface State and Dynamic Resistance during Resistance Spot Welding of 5182 Aluminum Alloy by Evdokimov A 1 , Michailov V 1 , Nikitin Alexander* 1 , Ossenbrink R 1 , Turabov D 1 1 BTU Cottbus-Senftenberg, Cottbus, Germany	2251 M
12:05	12:30	Quasi-in-situ observation of microstructure at the friction interface: shear deformation, dynamic recrystallization and mechanical responses during friction welding process by Fu B , Feng Jin* 1 , Junjun S , Klusemann B , Li J , Li W , Santos J , 1 Jiangsu University, Zhenjiang Jiangsu, China	2253
12:30	13:00	An approach to determine tool damage in friction stir welding by linear damage accumulation by Bergmann J 1 , Hasieber M 1 , Rohe M 1 , Martin Sennewald* 1 1 Technische Universität Ilmenau, Ilmenau, Germany	2262 M
13:00	14:25	Lunch Break	
Symposium on Measurement Technology for RSW/FSW Chair: Prof. Hee Seok Chang (Republic of Korea), Dr. Murali Tumuluru (USA)			
14:25	14:50	Development of a Generalized Inline Void Defect Detection Solution for Friction Stir Welding based on Force Feedback and Artificial Intelligence by Pascal Rabe*1, A. Schiebahn1, U. Reisinger1 1Welding and Joining Institute (ISF), RWTH Aachen University, Pontstraße 49, 52062 Aachen, Germany	2218 M
14:50	15:15	Development of a method for determining the contact and material resistance of aluminium alloys by Andreas Fezer* , Materials Testing Institute (MPA) University of Stuttgart, Stuttgart Baden-wuerttemberg, Germany	2265 M
15:15	15:40	Study on Non-Contact Measurement of Nugget Diameter in RSW by Laser Ultrasonic Method by Kazufumi NOMURA1*, Shintaro MISHIMA1, Tomokazu SANO1 1 Division of Materials and Manufacturing Science, Graduate School of Engineering, Osaka University, Japan	2243
Symposium on Failure Analysis in RSW Chair: Dr. Murali Tumuluru (USA), Prof. Elliot Biro(Canada)			
15:40	16:05	Investigating sequential failure of resistance spot weld groups under tensile-bending loading conditions by Betiku O 1 , Biro E 1 , Butcher C 1 , Ghassemi-Armaki H 2 , Midawi A 1 , Mohammad Shojaee* 1 , Tolton C 1 , Worswick M 1 , Zhang T 2 1 University Of Waterloo, Waterloo Ontario, Canada 2 General Motors, Warren Michigan, USA	2274
16:05	16:45	Coffee Break	
16:45	17:10	Mechanical properties and failure behavior of Weld-Bonded Advanced High-Strength Steels by Leon-Henao H , Ramirez A , Kaue Riffel* The Ohio State University, COLUMBUS, Ohio, USA	2267
17:10	17:35	Damage mechanism and suppression strategy of parallel gap resistance welding between flexible solar cells and interconnectors by Nannan Chen*, Guanzhi Wu, Min Wang Shanghai Key Laboratory of Materials Laser Processing and Modification, Shanghai Jiao Tong University, Shanghai 200240, China	2231

17:35	18:00	<p>Research on friction stir welding of advanced ultrahigh-strength steels by Zhiwei Wang*<sup>1,2</sup>, Peng Xue<sup>1,2</sup>, Dingrui Ni<sup>1,2</sup>, and Zongyi Ma<sup>1,2</sup> <sup>1</sup> Shi-changxu Innovation Center for Advanced Materials, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China <sup>2</sup> CAS Key Laboratory of Nuclear Materials and Safety Assessment, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China</p>	2229
18:00	18:25	<p><b>List of Resolutions and Closure</b>  <b>Commission III Chair: Prof. Hee Seok Chang</b></p>	