

13th International Symposium on Friction Stir Welding (V5)

TUESDAY 21 May 2024 (Morning)						
8.00 onwards	REGISTRATION					
	Room B-1					
Session 1	Plenary I Chairs:					
09.00 > 09.20	Welcome and Opening Remarks					
	Author(s)	Affiliation	Paper title			
09.20 > 09.50	<u>Axel Meyer</u>	Riftec	20 years of industrial production of friction stir welded products - from first references to recent innovations			
09.50 > 10.20	<u>Hovanski, Yuri</u>	Brigham Young University	Production Evaluation of RFSSW Automotive Door Assembly			
	Room B-1			Room B-2		
Session 2	Techniques I Chairs:			Dissimilar I Chairs:		
	Author(s)	Affiliation	Paper title	Author(s)	Affiliation	Paper title
10.40 > 11.00	<u>Fabian Fritsche</u> Martin Werz Stefan Weihe	Materials Testing Institute University of Stuttgart	Development of an innovative material feeding to overcome tolerance-based gaps in friction stir butt welding	<u>Toshiaki Yasui</u> Hiroyuki Nojiri Sota Hatanaka	Toyohashi University of Technology	Influence of welding tool shape on butt weld interface between steel and aluminum by friction stir welding
11.00 > 11.20	<u>Shoji Matsumoto</u> Ippei Sato Naonori Shibata Tetsuya Saruwatari Naruhito Matsumoto	Keihin Ramtech Co Ltd	Basic characteristics and future prospects in Synchronous Stir Welding	<u>Brayden Terry</u> Alvin Strauss	Vanderbilt University	Dissimilar Friction Stir Welding of Thin Sheet Nitinol and Ti-6Al-4V
11.20 > 11.40	<u>Takuya Miura</u> Yoshiaki Morisada Kohsaku Ushioda Hidetoshi Fujii	Joining and Welding Research Institute, Osaka University	Friction stir welding of steel with efficiently water-cooled steel tool	<u>Robin Göbel</u> Martin Werz Stefan Weihe	Materials Testing Institute (MPA) University of Stuttgart	Enhancing weld quality in friction stir welding of hybrid aluminum-steel tailor welded blanks - tool material influence on process robustness
11.40 > 12.00	<u>Dominik Walz</u> Martin Werz Stefan Weihe	MPA University of Stuttgart	Development and optimization of a welding gun for friction stir welding in automotive applications	<u>Sanjay Krishnamurthy Channappa</u> Sophie Rylandt Aude Simar	Université Catholique de Louvain	Significance of Friction Melt Bonding for joining dissimilar titanium and aluminum alloys

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	Room B-1			Room B-2		
Session 3	Steel I Chairs:			Additive I Chairs:		
	Author(s)	Affiliation	Paper title	Author(s)	Affiliation	Paper title
13.00 > 13.20	Lucas Oppeneiger ¹ Ozan Caliskanoglu ¹ , Christian Pfeiffer ¹ , Gregory Togyeni ² , Santonu Ghosh ³	Stirtec GmbH ¹ Subsea 7 France ² Element Six UK Ltd ³	Friction stir welding of steel for pipeline fabrication using different tool materials	Ashwarya Deshpande ¹ Frank Pfeifferkorn ¹ , Christian Baumann ² , Sabine Schwarz ² , Stephan Krall ² , Friedrich Bleicher ²	University of Wisconsin-Madison ¹ TU Wien ²	Material flow and consolidation behavior of metal cutting chips during friction surfacing
13.20 > 13.40	Santonu Ghosh ¹ , Branislav Dzepina ¹ , Ali Khaghani ¹ , Stephen Cater ²	Element Six UK Ltd ¹ TWI Ltd ²	Influence of plate thickness on the friction stir welding of steel using PCBN FSW tool.	Saed S. Rezaeinejad Ton Bor, Martin Luckabaue Remko Akkerman	University of Twente	Post-Deposition Heat Treatment Effects on Friction Screw Extrusion Additive Manufacturing of an Al-Mg-Si Alloy
13.40 > 14.00	Takayuki Yamashita ¹ Wu Gong ² , Stefanus Harjo ² , Kohsaku Ushioda ¹ , Hidetoshi Fujii ¹	Osaka University ¹ Japan Atomic Energy Agency ²	Deformation and transformation behaviors in stir zone of friction stir welded medium Mn steel monitored by in-situ neutron diffraction	Ismail Zabeeullah Kolimi ¹ Julie Marteau ¹ , Salima Bouvier ¹ , Pierre Auguste ² , Fabien Lefebvre ² , Eric Nivet ²	Université de technologie de Compiègne ¹ Technological Institute of Mechanisms (CETIM) ²	Printability of Titanium Alloy Ti64 by Additive Friction Stir Deposition: Study of mechanical behaviour with linkages to local microstructures.
14.00 > 14.20	Mori Masakazu ¹ Yoshiaki Morisada ² , Hidetoshi Fujii ²	Ryukoku University ¹ Osaka University ²	Effect of GAP on steel joint formation by friction stir welding	Abhishek Sharma Yoshiaki Morisada, Kohsaku Ushioda, Hidetoshi Fujii	JWRI, Osaka University	Correlation between the thermal stability of Al ₁₃ Fe ₄ intermetallic phase and mechanical properties of the Al-Fe alloy fabricated via friction stir alloying
Session 4	Applications Chairs:			Performance Chairs:		
14.40 > 15.00	Yuri Hovanski ¹ John Hunt ² Enkhsaikhan Boldsaikhan ³ Dwight Burford ⁴ Frank E Pfeifferkorn ⁵	Brigham Young University ¹ TWB ² , Wichita State University ³ , University of North Texas ⁴ , University of Wisconsin-Madison ⁵	Establishing Generalized in Process Quality for Friction Stir Welding	Stefan Böhm Niklas Sommer	University of Kassel	Tailoring microstructure, precipitation behavior and hardness of high-strength aluminum alloys using operando techniques
15.20 > 15.20	Pedro de Sousa Santos	TWI Ltd	Development of friction stir welding for the large scale production of SiC power electronics for the next generation of electric vehicles - The SCIENZE project	Naoki Takeoka ¹ Tomo Ogura ² Tomoki Matsuda ² Akio Hirose ²	Kawasaki Heavy Industries, Ltd ¹ Osaka University ²	Analysis of Mechanical Properties of Aluminum alloy / Various Strength Steel Joints Using Scrubbing Refill Friction Stir Spot Welding
15.20 > 15.40	Jacques-Erwan Ducatez ¹ David Chartier ¹ , Frank Eberl ² , Julien Laye ³	Airbus Atlantic ¹ Constellium Isoire ² Constellium ³	AIRWARE® FSW Tailored-Welded-Blank for High Performance and Cost-Efficient Stiffened Panel for Aerospace Applications	Jhoan Guzman ¹ Martin McDonald ² , Owen Repp ² , Michael Eff ³ , Antonio Ramirez ¹	The Ohio State University ¹ Ground Vehicle Systems Center ² EWI ³	Ballistic Performance of Friction Stir Welded Armor-Grade Steel
15.40 > 16.00	Elizabeth Hovos	TWI Ltd	Towards Hydrogen Storage: FSW-Based Solutions and Challenges	Piyush Upadhyay Hrishikesh Das Shivakant Shukla Mitch Blocher	Pacific Northwest National Laboratory	Enabling 3T Friction stir lap welding of Aluminum alloys at high speeds.
16.00 > 17.00	Room B-1					
POSTER SESSION / USER GROUP MEETING / PANEL DISCUSSION						

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Room B-1							
Session 5							
Plenary II							
Chairs:							
Author(s)	Affiliation			Paper title			
09.00 > 09.20	Eff, Michael¹ Rafael Giorjao ¹ , Tim Stotter ¹ , Dang Cai ²			EWI ¹ Princeton Plasma Physics Laboratory ²			Friction Stir For Nuclear Fusion: Adapting FSW for Thick Section Dissimilar Copper Joints with Varying Base Material Properties
09.20 > 09.40	Henrik Blicher Schmidt			HBS Engineering ApS			Development of effective FSW models for training AI
09.40 > 10.00	Michael Hasieber² Markus Weigl ¹ , Franz Hesse ² , Martin Sennewald ² , Torsten Lohn ² , Jean Pierre Bergmann ²			Grenzbach Maschinenbau GmbH ¹ TU Ilmenau ²			Experimental investigation of FSW tool wear behaviour using conventional and stationary shoulder
10.00 > 10.20	Jason Jones¹ , Sam Holdsworth ²			Hybrid Manufacturing Technologies ¹ TWI Ltd ²			Innovative liquid cooling plates manufactured via CoreFlow® friction stir channelling on commercial equipment platforms
Room B-1				Room B-2			
Session 6				Techniques II			
Chairs:				Dissimilar II			
Chairs:				Chairs:			
10.40 > 11.00	Hideki Okada Yuusuke Yoshida	Kawasaki Heavy Industries Ltd	Both Side Stationery Shoulder Corner Friction Stir Welding	Jeong-Won Choi¹ Yoshiaki Morisada ² Huihong Liu ² , Kohsaku Ushioda ² , Hidetoshi Fujii ² , Kimiaki Nagatsuka ² , Kazuhiro Nakata ²	Hiroshima University ¹ Osaka University ²	Investigation on optimal temperature in dissimilar Ti/CFRP joint during friction stir welding	
11.00 > 11.20	Liladhar Kamble	THE M S University of Baroda	Design and development of Bobbin tool for FSW of Al alloys of thin sheets	Morgane Geyer¹ Marie-Noëlle Avettand-Fenoel ² , Vanessa Vidal ¹ , Farhad Rezaei Aria ¹ , Christine Boher ¹	Institut Clément Ader (ICA), Université de Toulouse ¹ Université de Lille, CNRS, INRAE ²	Multi-scale effects of the tool shape and length on the interfacial microstructure and the mechanical behaviour of Al2024/Ti-6Al-4V lap friction stir welds	
11.20 > 11.40	Louis Lecointre Lyne St-Georges, Kadiata Ba	UQAC - Université du Québec à Chicoutimi	Study of Friction Stir Welding with Bobbin Tool of aluminum	Xiankun Zhang Lei Shi ChuanSong Wu	Institute of Materials Joining, Shandong University	Numerical and experimental study of Ti/Al dissimilar joining by ultrasonic vibration enhanced friction stir welding	
11.40 > 12.00	Jonathan Martin	TWI Ltd	eLOP : Elimination of lack of penetration welding	Savavana Sundar¹ Adepu Kumara ¹ Krishna Kishore Mugada ²	National Institute of Technology ¹ Sardar Vallabhbhai National Institute of Technology ²	Feasibility of static shoulder friction stir welding in joining dissimilar metals of Al6061 to Ti6Al4V	

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WEDNESDAY 22 May 2024 (Afternoon)

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	Room B-1			Room B-2		
Session 7	Steel II Chairs:			Fundamentals Chairs:		
	Author(s)	Affiliation	Paper title	Author(s)	Affiliation	Paper title
13.00 > 13.20	<u>Jungi Chen</u> Takuya Miura, Kohsaku Ushioda, Hidetoshi Fujii	Joining and Welding Research Institute, Osaka University	Microstructures and tensile properties of friction stir welded high phosphorus weathering steel	<u>Jan Backlund</u> ¹ Wojciech Osikowicz ¹ Henrik Hindsefelt ²	Hydro Innovation & Technology ¹ Combitech ²	The effect of post weld natural ageing on mechanical properties of 6000-series aluminum alloys
13.20 > 13.40	<u>Antonio Ramirez</u> ¹ Jhoan Guzman ¹ Michael McDonald ² , Owen Repp ² , Michael Eff ³	The Ohio State University ¹ Ground Vehicle Systems Center ² , EWI ³	Characterization of Armor-Grade Steels Friction Stir Welding Joints	<u>Fabian Vietorf</u> Martina E Sigl, Amanda Zens, Michael F Zaeh	Technical University of Munich	Automated Visual Inspection of Friction Stir Welds Using Image Segmentation Algorithms
13.40 > 14.00	<u>Niels Troost</u> J H den Besten	Delft University	Friction Stir welded joints in steel maritime structures: Micro-material scale characteristic fatigue properties	<u>Hemant Agiwal</u> Aishwarya Deshpande Frank E Pfefferkorn	Department of Mechanical Engineering, University of Wisconsin-Madison, USA	Visualization of material flow dynamics during void formation in friction stir welding of aluminum alloys using high speed X-ray imaging
14.00 > 14.20	<u>Austen Shelton</u> Alvin Strauss	Vanderbilt University	Joint Strength Optimization of Friction Stir Welded, Small Diameter, AISI 304 Stainless Steel Hemispheres without Internal Supports	<u>Masatoshi Enomoto</u>	Wise Corporation	Education of Friction Stir Welding in Japan
Session 8	FSW Tools Chairs:			Additive II Chairs:		
14.40 > 15.00	<u>Benoit Coqnet</u> Landry Giraud	TRA-C industrie	Influence of tool features and machine piloting on the weld quality	<u>Christopher Smith</u> Kenneth Ross, David Garcia Tianhao Wang	Pacific Northwest National Laboratory	Effect of Rod Orientation and Diameter on Additive Friction Surfacing of Steel
15.00 > 15.20	<u>Toni Sprigode</u> ¹ Andreas Gester ¹ , Guntram Wagner ¹ , Ulrich Degenhardt ²	Chemnitz University of Technology ¹ QSIL Ingenieurkeramik GmbH ²	Realization of Friction Stir Welding of Aluminum/Aluminum Joints Using Ceramic Tools	<u>Hemant Agiwal</u> ¹ Frank Pfefferkorn ¹ , Aishwarya Deshpande ¹ Christian Baumann ² Stephan Krall ² , Friedrich Bleicher ²	University of Wisconsin-Madison ¹ TU Wien ²	Dimensionless numbers for predicting process parameter boundaries in friction surfacing
15.20 > 15.40	<u>Michael Hasieber</u> ¹ Hugo Hülsmann ¹ , Martin Sennewald ¹ , Torsten Löhn ¹ , Markus Weigl ² Jean Pierre Bergmann ¹	Technische Universität Ilmenau ¹ Grenzebach Maschinenbau GmbH ²	The influence of FSW tool wear in relation to the axial force	<u>Neeraj Mishra</u> Amber Shrivastava	Indian Institute of Technology Bombay	Microstructure and mechanical characterisation of friction stir metal deposited Inconel 600 superalloy
15.40 > 16.00	<u>Martin Sennewald</u> Christian Knopf, Michael Hasieber, Jean Pierre Bergmann	Technische Universität Ilmenau	Method of determining tool damage on FSW tools using linear damage accumulation	<u>Siddharth Tamang</u> Vishal Mishra	Indian Institute of Technology Kharagpur	Fabrication and Characterization of Aluminium Alloy foam by Friction Stir Processing and Microwave Heating
SOCIAL EVENT						

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	Room B-1					
Session 9	Plenary III Chairs:					
	Author(s)	Affiliation	Paper title			
09.00 > 09.20	<u>Laurent Dubourg</u>	Stirweld	Friction Stir Welding: a game changer for thermal efficiency and cost reduction of liquid cold plates.			
09.20 > 09.40	<u>Christian Wansing</u>	Fooke GmbH	Friction Stir Welding of fuselage panels - Metallic large component manufacturing in the aircraft industry			
09.40 > 10.00	<u>Dale Fleck</u> Russell Steel, Murray Mahoney	Mazak MegaStir	High Speed FSW Discussion will teach how to produce FSW at 3X current traverse speeds detailing test data supporting the jump to 6000 mm/min.			
10.00 > 10.20	<u>Yoshiaki Morisada</u> Danilo Ambrosio, Abhishek Sharma Muneaki Mukuda, Hidetoshi Fujii	Joining and Welding Research Institute, Osaka University	Novel friction stir welding method using a hemispherical-shaped tool tilted toward retreating side			
	Room B-1			Room B-2		
Session 10	Techniques III Chairs:			Modelling Chairs:		
10.40 > 11.00	<u>Chris Punshon</u> ¹ Stephen Cater ² Santonu Ghosh ³	Cambridge Vacuum Engineering ¹ TWI Ltd ² Element 6 ³	Development of Friction stirwelding for the provision of overhead position root passes for fabrication of large, heavy section steel structures	<u>Ramin Delir</u> ¹ Niklas Sommer ¹ Stefan Böhm ¹ Mehmet Arda Ehren ²	University of Kassel ¹ Ozyegin University ²	Implementation of a Bayesian optimization routine to predict the process-structure-interrelationships during dissimilar FSW of aluminum alloys AA5083 to AA7020
11.00 > 11.20	<u>Kunitaka Masaki</u> Kazuya Kojima Hiroshi Saito, Koji Nezaki	IHI Corporation	Localized melting-induced defects accompanied by abnormal plastic flow in Bobbin-tool FSW of 5083 aluminum alloy	<u>Elizabeth Hoyos</u> ¹ María Camila Serna ¹ Christian Lochmuller ¹ Yesid Montoya ¹ Jorge Córdoba ¹ Leidy Marcela Hoyos ²	Universidad EIA ¹ Universidad EAFIT ²	A Data-Driven Approach to Predicting Joint Efficiency in FSW of Aluminum Alloys
11.20 > 11.40	<u>Sam Holdsworth</u>	TWI Ltd	CoreFlow® friction stir channelling of copper for fusion energy applications	<u>Krishna Kishore Mugada</u> Vishwa Menpara	Sardar Vallabhbhai National Institute of Technology	Experimental and numerical investigation of temperature and residual stresses during friction stir additive manufacturing of Al-Mg-Si alloys
11.40 > 12.00	<u>Debanjan Maity</u> Vikranth Racherla	Indian Institute of Technology, Kharagpur	Feasibility investigation of a new friction processing-based joining technique for Ni-Al dissimilar metal welding	<u>Hao Su</u> Ji Chen ChuanSong Wu	Institute of Materials Joining, Shandong University	Numerical modeling of the periodic material flow behavior in friction stir welding

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	Room B-1			Room B-2		
Session 11	FSSW Chairs:			High Temperature Chairs:		
	Author(s)	Affiliation	Paper title	Author(s)	Affiliation	Paper title
13.00 > 13.20	Matteo Bernardi Uceu F H Suhuddin Benjamin Klusemann	Helmholtz-Zentrum Hereon	Refill friction stir spot welding, ongoing research and perspectives from Helmholtz Zentrum Hereon	Dongsheng Li	AM Energization Corp	Friction Stir Processing of High Temperature High Entropy Alloy
13.20 > 13.40	Masahiro Miyake Syuhei Yoshikawa Naoki Takeoka, Ryoji Ohashi, Tadahiro Edagawa	Kawasaki Heavy Industries Ltd	Development of robot system for Refill Friction Stir Spot Welding	Yutaka Sato Yusuke Kawata Shun Tokita Takeshi Wada Hidemi Kato	Tohoku University	Friction Stir Welding of a Ferritic Stainless Steel to Fe-Ni-Cr Precursor Alloy for Liquid Metal Dealloying
13.40 > 14.00	Yoshikawa Shuhei Ryoji Kubota Yoshiyuki Shimizu Naoki Takeoka Ryoji Ohashi Shun Tokita Yutaka S. Sato	Kawasaki Heavy Industries, Ltd	Reaction and wear of cemented carbide tool during scrubbing refill friction stir spot welding of aluminum alloy to steel	Tomoya Nagira ¹ Takahiro Sawaguchi ¹ Terumi Nakamura ² Masakazu Mori ³ Yoshiaki Morisada ⁴ Hidetoshi Fujii ⁴	National Institute for Materials Science ¹ The Japan Welding Engineering Society ² Ryukoku University ³ Osaka University ⁴	Friction stir welding of Fe-Mn-Si seismic damping alloy
14.00 > 14.20	Fabian Vieltorf Amanda Zens Martina Elisabeth Sigl	TU Munich / iwb	Micro-Friction Stir Spot Welding (μ FSSW) for Internal Li-Ion Battery Cell Contacts	Kenneth Ross David Garcia Tianhao Wang Christopher Smith	Pacific Northwest National Laboratory, Richland, WA, USA	Advances in Friction Stir Processing and Large Scale Additive Friction Surfacing of Steels
	Room B-1					
Session 12	Plenary IV Chairs					
	Author(s)	Affiliation	Paper title			
14.40 > 15.10	Hugo Robe R Stricher	Institut de Soudure	FSW in-process monitoring: a few cases study			
15.10 > 15.40	Kevin Colligan	Concurrent Technologies Corp.	Unit-Area Analysis of Friction Stir Welding Data			
15.40 > 16.00	Closing					

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FRIDAY 29 June 2018 (Morning)

OPTIONAL INDUSTRIAL VISIT

POSTERS

Author(s)	Affiliation	Paper title
Jignesh Nakrani	Indian Institute of Technology Bombay	Prediction of Fatigue Crack Propagation in Aluminium-Steel Dissimilar Joints
Steve Korakan Ales	Papua New Guinea University of Technology	Fatigue strength of Al Interlayer Aluminium to Titanium Friction Stir Lap Welded Joints
Toshiaki Yasui	Toyohashi University of Technology	Lap joining between carbon fiber reinforced thermo-plastic and aluminum alloy with porous protrusion structure by friction stirring
Ganga Raju	Axis Cades Aerospace Pvt Ltd	Mechanical properties and weld characteristics of friction stir welding of Nylon 6 and HDPE Plastics by using Induction control heat-assisted tool
Shaokang Guan	Zhengzhou University	Microstructure, mechanical properties and corrosion behavior of friction stir processed MgZnYNd Alloys with HA/ β -TCP coating for biomedical application
Yufeng Sun	Zhengzhou University	Microstructure and mechanical properties of submerged friction stir butt welded 1500MPa martensitic steel plates with post-weld heat treatment
Luqman Shah	Universiti Malaysia Pahang Al-Sultan Abdullah	Microstructure and texture evolution of dissimilar friction stir welded AA5052 and AA6061 aluminum alloys
Chuanson Wu	Institute of Materials Joining, Shandong University	Multi-phase field simulation of intermetallic compounds formation and growth in dissimilar FSW of Al/Mg alloys
Shengli Li	Institute of Materials Joining, Shandong University	Micromechanical modeling of the creep behavior of friction stir welded reduced activation ferritic/martensitic steel
Lei Shi	Institute of Materials Joining, Shandong University	Enhancing the mechanical properties of medium-thick Ti/Al dissimilar joints by double-side friction stir Z shape butt-lap welding
Harish Kumar Arya	Sant Longowal Institute of Engineering & Technology	A review of cooling assisted (under-water) friction stir welding
Pedro de Sousa Santos	TWI Ltd	Stationary shoulder-micro friction stir welding of thin aluminium liners for hydrogen tanks