

7th International Friction Stir Welding Symposium, Awaji Island, Japan.

The 7th Symposium in this series was held between 20th and 22nd May 2008 at the Awaji Yumebutai conference centre on Awaji Island, just west of Kobe, Japan. The event attracted over 170 visitors, which although slightly fewer than the last event in Canada, met our expectations. Delegates came from 17 countries.

Technically, the event was a great success, with 81 oral presentations on friction stir welding, as well as 15 posters, making this the largest number of papers yet presented in any dedicated friction stir welding event. There were many new developments reported, as well as many valuable incremental advances. This conference had simultaneous translation between Japanese and English, which was appreciated by most delegates, and certainly helped in promoting discussion.

The venue was excellent in all respects, as it was a purpose built conference centre and hotel complex, and similar facilities are surprisingly hard to find in Japan.

Figure 1 shows the flags of the delegate's nations flying outside the conference centre, a much appreciated welcoming touch from the venue. Figure 2 shows the four delegates who have attended all seven Symposia. These are from left to right Jorge dos Santos (GKSS, Germany), François Marie (EADS, France), Phil Threadgill (who has only attended 6!), Masaki Kumagai (Sumitomo Light Metals, Japan) and Kevin Colligan (Concurrent Technologies Corporation, USA). Numerous people have attended five or six.

The Symposium was organised as usual by Phil Threadgill and Rachel Wall. However, Phil is now standing down from his role after working on all seven Symposia, and his place will be taken by Jonathan Martin.

The 8th Symposium will take place in Germany on 18-20 May 2010, when GKSS will be our local partner. The venue will be the MARITIM Seehotel Timmendorfer Strand, Germany



7th International Friction Stir Welding Symposium, 20-22 May 2008, Awaji Island, Japan

Tuesday 20th May

Time	Authors(s)	Affiliation	Title
0830-0920	Registration		
	Session 1 - Plenary Session	Chairmen: Harumichi Hino / Ian Norris	
0920-0945	A Askari ¹ , J A Baumann ¹ , R G Landers ²	¹ The Boeing Co; ² Missouri University of Science and Technology, USA	Partitioning of forces in friction stir welding
0945-1010	R Ohashi ¹ , M. Fujimoto ¹ , S. Koga ¹ , R Ikeda ² , M Ono ²	¹ Manufacturing Technology Department, System Technology Development Center, Kawasaki Heavy Industries Ltd; ² Joining & Strength Research Department, Steel Research Laboratory, JFE Steel Corporation, Japan	Friction spot joining of steel sheets with silicone nitride tool
1010-1035	Coffee Break		
	Session 2A: Spot 1 (Al-steel)	Chairmen: Toshiaki Yasui / Dwight Burford	
1035-1100	J A E Mazzaferro ^{1,2} , T de Souza Rosendo ^{2,3} , C C P Mazzaferro ^{2,3} , F D Ramos ^{2,3} , M A D Tier ^{2,4} , T R Strohaecker ³ , J F dos Santos ²	¹ Universidade Federal do Rio Grande do Sul/PROMEC-DEMEC, Brazil ; ² GKSS Research Centre/Institute of Materials Research-Materials Mechanics Solid State Joining Processes (WMP), Germany ; ³ Universidade Federal do Rio Grande do Sul/PPGEM-DEMET, Brazil ; ⁴ Universidade das Missões - URI, Departamento de Engenharia e Ciências de Computação, Brazil	Preliminary Investigation on the mechanical behaviour of aluminium friction spot welds
1100-1125	M Fukumoto ¹ , K Miyagawa ² , H Matsumura ² , T Yasui ¹ , M Tsubaki ¹ ,	¹ Department of Production Systems Engineering, Toyohashi University of Technology; ² Graduate Student, Department of Production Systems Engineering, Toyohashi University of Technology, Japan	Influence of zinc coated layer on spot welding between aluminium alloy and zinc coated steel by friction stirring
1125-1150	K Miyagawa ¹ , H Matsumura ¹ , T Yasui ² , M Tsubaki ² , M Fukumoto ²	¹ Graduate student, Department of Production Systems Engineering, Toyohashi University of Technology; ² Department of Production Systems	The microstructure of interface in spot welding between aluminium alloy and high- tensile strength steel by friction stirring

		Engineering, Toyohashi University of Technology Japan	
1150-1215	K Tanaka , M Kumagai, H Yoshida,	Sumitomo Light Metal Industries Ltd., Japan	Dissimilar joining of aluminium alloy and steel sheets by friction stir spot welding
Session 2B: Modelling 1		Chairmen: Masato Tsujikawa / Tom de Vuyst	
1035-1100	A Kumar ¹ , D P Fairchild ¹ , S J Ford ² ,	¹ ExxonMobil Upstream Research Company; ² ExxonMobil Development Company, USA	Modelling of heat transfer and material flow during FSW of steel
1100-1125	Z W Chen , S Cui,	Dept of Mechanical and Production Engineering, Auckland University of Technology, New Zealand	Material flow phenomenon in thread space and the resulting mode of nugget zone formation during FSW
1125-1150	T De Vuyst ¹ , V. Madhavan ¹ , B. Ducoeur ² , A. Simar ² , B. de Meester ² , L. D'Alvise ¹	¹ CENAERO; ² Université Catholique de Louvain, Belgium	A thermo-fluid/thermo-mechanical modelling approach for computing temperature cycles and residual stresses in FSW
1150-1215	H B Schmidt , J H Hattel,	Technical University of Denmark, Department of Engineering, Denmark	A thermal-pseudo-mechanical model for the heat generation in friction stir welding
1215-1315	Lunch		
Session 3A: Process/Control 1		Chairmen: Takahiro Nagayama / Kevin Colligan	
1315-1340	G Luan , G Li, C Li, C Dong	China FSW Centre Beijing FSW Technology Co Ltd, China	DC-LSND friction stir welding
1340-1405	D G Richards ¹ , P B Prangnell ¹ , P J Withers ¹ , S W Williams ² , T Nagy ² , S Morgan ³	¹ Manchester Materials Science Centre, UMIST; ² Cranfield University, Welding Engineering Research Centre; ³ BAE Systems, Optics and Laser Technology Department, Advanced Technology Centre, UK	Simulation of the effectiveness of dynamic cooling for controlling residual stresses in friction stir welds
1405-1430	C B Smith ¹ , J F Hinrichs ¹ , L M Cerveny ¹ , R Anderson ²	¹ Friction Stir Link; ² Keystone Synergistic Enterprises Inc, USA	Fabricated shapes using a friction stir welding/forging process
1430-1455	M Tsujikawa ¹ , H Takahara ² , Y Okawa ³ , M Taniguchi ³ , S Oki ⁴ , K Higashi ²	¹ Graduate School of Engineering, Osaka Prefecture University; ² Graduate Student, Osaka Prefecture University (Present address: Mitsubishi Heavy Industries, Ltd.); ³ Technology Research Institute of Osaka Prefecture; ⁴ School of Science and Engineering, Kinki University, Japan	Optimum processing for three-dimensional friction stir welding

	Session 3B: Steel 1	Chairmen: Hidetoshi Fujii / Harsha Badarinarayan	
1315-1340	J Bernath , B Thompson, N Ames	EWI, USA	Friction stir welding of steel and hard metals – Advancements in tool technology and thick section welding
1340-1405	C-L Chen ¹ , H Al-Badairy ¹ , G J Tatlock ¹ , A R Jones ¹ , G McColvin ² ,	¹ Materials Science, Department of Engineering, University of Liverpool; ² Alstom Power Systems, UK	Microstructural characterization of friction stir welded FeCrAl ODS alloys
1405-1430	T Ishikawa ¹ , H Fujii ² , K Genchi ¹ , S Iwaki ¹ , S Matsuoka ¹ , K Nogi ²	¹ Tokyu Car Corporation; ² Joining & Welding Research Institute, Osaka University, Japan	High-speed and high quality friction stir welding of austenitic stainless steel
1430-1455	R Steel ¹ , Q Liu ¹ , X Yao ¹ , S Packer ² , Todd Leonhardt ³	¹ Smith MegaDiamond Inc; ² Advanced Metal Products; ³ Rhenium Alloys, Inc, USA	FSW tool material developments for joining high melting temperature materials
1455-1520	Coffee Break		
	Session 4A: Process/Microstructure 1	Chairmen: Takeshi Shinoda / Phil Prangnell	
1520-1545	N T Kumbhar , K Bhanumurthy	Materials Science Division, Bhabha Atomic Research Centre, India	Friction stir welding of aluminium alloy 5052
1545-1610	M M Z Ahmed ^{1,2} , B P Wynne ¹ , W M Rainforth ¹ , P L Threadgill ³ ,	¹ Institute for Microstructural and Mechanical Processing Engineering, University of Sheffield, UK ; ² Lecturer Assistant, Department of Metallurgical and Materials Engineering, Suez Canal University, Suez branch, Egypt ; ³ TWI Ltd., UK	An investigation of hardness, microstructure and crystallographic texture in thick sectioned friction stir welded AA6082
1610-1635	S. Kumai ¹ , M Watanabe ²	¹ Department of Materials Science and Engineering, Tokyo Institute of Technology; ² Graduate Student, Tokyo Institute of Technology, Japan	Microstructure and mechanical properties of friction stir welded aluminium alloy/steel lap joint
1635-1700	M Ruhstorfer , M F Zaeh	Technische Universität München, Institute for Machine Tools and Industrial Management (iwb), Germany	Friction stir welding of steel reinforced aluminium extrusions
	Session 4B: Non ferrous	Chairmen: Tadashi Nishihara / Zhan Chen	
1520-1545	T Källgren, L-Z Jin, R Sandström	Department of Materials Science and Engineering, Royal Institute of Technology, Sweden	Material flow during friction stir welding of copper

1545-1610	T Morishige ¹ , M Tsujikawa ¹ , M Hino ² , S Oki ³ , T Hirata ⁴ , K Higashi ¹ ,	¹ Department of Materials Science, Graduate School of Engineering, Osaka Prefecture University; ² Industrial Technology Research Institute of Okayama Prefecture; ³ School of Science and Engineering, Kinki University; ⁴ Technology Research Institute of Osaka Prefecture, Japan	Effect of second phase dispersion by friction stir processing on cast Mg alloys
1610-1635	K J Savolainen , T Saukkonen, J Mononen, H Hänninen	Helsinki University of Technology, Finland	Entrapped oxide particles in friction stir welds of copper
1635-1700	P Gougeon ¹ , M da Silva ² , L St-Georges ² , X-G Chen ^{2,3}	¹ Aluminium Technology Centre, NRC; ² Université du Québec à Chicoutimi; ³ Rio Tinto Alcan, Arvida R&D Centre, Canada	Microstructural and mechanical study of joints produced by friction stir welding on Al-B ₄ C metal matrix composites
1715-1830	Licensees meeting:		
Wednesday 21st May			
	Session 5A: Aerospace	Chairmen: Takao Okada / François Marie	
0830-0855	C G Derry , J D Robson	Materials Science Centre, School of Materials, University of Manchester, UK	Characterisation and modelling of toughness in 7449-TAF aerospace aluminium alloy friction stir welds
0855-0920	W Van Haver ¹ , K Deplus ² , B de Meester ² , A Simar ² , W Van Daele ³ , J Defrancq ³ , A Dhooge ³	¹ Research Centre of the Belgian Welding Institute; ² Université catholique de Louvain - Unité de Production Mécanique et Machines Louvain-La-Neuve; ³ Ghent University – Faculty of Engineering, Belgium	Friction stir butt welding of thin 5754-H111 sheet for aerospace applications
0920-0945	N. Kamp ¹ , P A Colegrove ² , H R Shercliff ³ , J D Robson ¹	¹ School of Materials, University of Manchester; ² Welding Engineering Research Centre, Cranfield University; ³ Department of Engineering, University of Cambridge, UK	Microstructure-property modelling for friction stir welding of aerospace aluminium alloys
0945-1010	L Dubourg ¹ , A Merati ² , M Gallant ² , M Jahazi ¹	¹ Aerospace Manufacturing Technology Centre, Institute for Aerospace Research, National Research Council; ² Structures and Materials Performance Lab, Institute for Aerospace Research, National Research Council, Canada	Manufacturing of aircraft panels by friction stir lap welding of 7075-T6 stringers on 2024-T3 skin: process optimisation and mechanical properties

Session 5B: Friction Stir Processing		Chairmen: Tadashi Nishihara / Murray Mahoney	
0830-0855	T Hirata ¹ , T Tanaka ¹ , S W Chung ² , Y Takigawa ³ , K Higashi ³ ,	¹ Technology Research Institute of Osaka Prefecture, Japan ; ² Daewoo Shipbuilding & Marine Engineering, South Korea ; ³ Graduate School of Engineering, Osaka Prefecture University, Japan	Microstructural evolution by friction stir processing in superplastic Zn-22wt%.Al alloy
0855-0920	K Kii , T Morishige, M Kohdu, M Tsujikawa, K Higashi	Department of Material Science, Osaka Prefecture University, Japan	Effect of friction stir processing on room temperature formability of Mg alloy AZ31
0920-0945	T Minton ¹ , J Au ¹ , R Bulpett ²	¹ School of Engineering and Design, Brunel University; ² Experimental Techniques Centre, Brunel University, UK	Friction stir welding of AA5083 and AA2004, commercially available SFP aluminium alloys, for subsequent superplastic forming
0945-1010	L Guo ¹ , K. Yamamura ² , T Nishihara ³ ,	¹ Graduate Student, Kokushikan University; ² Yamamura Mfg. Co. Ltd; ³ School of Science and Engineering, Kokushikan University, Japan	Control of superplastic Zn-22Al alloy microstructure using FSP
1010-1035 Coffee Break			
Session 6A: Process/Control 2		Chairmen: Toshiaki Yasui/ Chris Smith	
1035-1100	P Gebhard , M F Zaeh,	Technische Universität München, Institute for Machine Tools and Industrial Management, Germany	Force control design for CNC-milling machines for friction stir welding
1100-1125	T Jene ^{1,2} , G Dobmann ¹ , G Wagner ² , D Eifler ² ,	¹ Fraunhofer Institute for Non-Destructive Testing, University, Campus E3; ² Institute of Materials Science and Engineering, University of Kaiserslautern, Germany	MonStir – Monitoring of the friction stir welding process
1125-1150	F E Pfefferkorn , A Fehrenbacher, N A Duffie, N J Ferrier	Dept of Mechanical Engineering, University of Wisconsin-Madison, USA	Closed-loop control of temperature in friction stir welding
1150-1215	S Zimmer ¹ , L Langlois ¹ , J Laye ² , J-C Goussain ² , P Martin ¹ , R Bigot ¹	¹ Arts et Métiers Paris Tech – LGIPM; ² Institut de Soudure - FSW Center, France	Methodology for qualifying a friction stir welding equipment
Session 6B: Steel 2		Chairmen: Yoshihiko Kitagawa / Raghavan Ayer	
1035-1100	M F Sinfield ¹ , J C Lippold ² , B T Alexandrov ²	¹ Naval Surface Warfare Center, Carderock Division; ² The Ohio State University, Welding Engineering Program, USA	Physical simulation of friction stir weld microstructure of a high-strength, low alloy steel (HSLA-65)

1100-1125	H Fujii , T Tatsuno, T Tsumura, R Ueji, K Nakata, K Nogi	Joining & Welding Research Institute, Osaka University, Japan	Laser assisted hybrid friction stir welding of carbon steel
1125-1150	M Mahoney ¹ , R Steel ² , T Nelson ³ , S Packer ² , C Sorensen ³	¹ Consultant; ² Megastir; ³ Brigham Young University, USA	Friction stir welding of HSLA-65 steel with low/no distortion
1150-1215	C A W Olea, P Loaec, J G dos Santos	GKSS Forschungszentrum, Institute of Materials Research, Germany	Mechanical and microstructural characterization of friction stir welded usibor steel
1215-1315 Lunch			
Session 7A: Spot 2 (Mg/Fe/Al)		Chairmen: Shinji Koga / Paul Gebhard	
1315-1340	S Mironov ¹ , R Ohashi ² , M Fujimoto ² , Y S Sato ¹ , H Kokawa ¹	¹ Department of Materials Processing, Graduate School of Engineering, Tohoku University; ² Manufacturing Technology Department, System Technology Development Center Kawasaki Heavy Industries Ltd, Japan	Solid-state phase transformation of DP-590 steel during friction spot joining
1340-1405	Q Yang ¹ , S Mironov ² , Y S Sato ² , K Okamoto ³	¹ Hitachi America Ltd, USA ; ² Tohoku University, Japan ; ³ Hitachi Ltd, Japan	Microstructure and mechanical properties of friction stir spot welded AZ31 Mg alloy
1405-1430	M Tier ^{1,2} , T Rosendo ³ , C W Olea ³ , C Mazzaferro ³ , F D Ramos ³ , M Bayer ³ , J F dos Santos ⁴ , A da Silva ⁵ , J Mazzaferro ⁶ , T R Strohaecker ⁶	¹ Visiting Scientist, GKSS Forschungszentrum, Institute for Materials Research, Materials Mechanics and Joining, Solid-State Joining Processes, Germany ; ² Universidade Regional Integrada - URI, DECC, Brazil ; ³ PhD student, GKSS Forschungszentrum, Institute for Materials Research, Germany ; ⁴ Solid-State Joining Processes, Institute for Materials Research, Materials Mechanics and Joining, GKSS Forschungszentrum, Germany ; ⁵ LORTEK - Centro de Investigación en Tecnologías de Unión, Spain ; ⁶ Universidade Federal do Rio Grande do Sul, PROMEC-UFRGS, Brazil	The influence of weld microstructure on mechanical properties of refill friction spot welding of 5042 aluminium alloy
1430-1455	A Echeverria, A Zabaleta, P Alvarez, E Aldanondo, J Solis, A A M da Silva	LORTEK – Centro de Investigación en Tecnologías de Unión, Spain	Feasibility investigation of similar and dissimilar AA2024 and AA7075 friction stir spot welded aluminium alloys
Session 7B: Microstructure 2		Chairmen: Hiroyuki Kokawa / Rolf Sandstrom	

1315-1340	M Gutensohn, O Klag, G Wagner , D Eifler	Institute of Materials Science and Engineering, University of Kaiserslautern, Germany	Microstructure and deformation behaviour of friction stir welded light metals
1340-1405	T Yasui ¹ , M Kuwahara ² , M Tsubakil ¹ , M Fukumoto ¹	¹ Department of Production Systems Engineering, Toyohashi University of Technology; ² Graduate Student, Department of Production Systems Engineering, Toyohashi University of Technology, Japan	Material flow and forces in dissimilar metal welding by friction stirring
1405-1430	T Shinoda	Kosei Aluminium Co., Ltd. (Previously Professor of Nagoya University), Japan	Observation of metal flow phenomenon in friction stir welding of aluminium alloy
1430-1455	L St-Georges , L I Kiss, V Dassylva-raymond	Université du Québec à Chicoutimi, Canada	Mixing mechanism in friction stir welding of metallic composites
1455-1520	Coffee Break		
	Session 8A: Process/Control 3	Chairmen: Hidetoshi Fujii / Brian Bishop	
1520-1545	D Otsuka , Y Sakai	Technology Integrating Department, Rolling Stock Division, Nippon Sharyo, Ltd., Japan	Self reacting pin tool application for railway car body assembly
1545-1610	M Soron	ESAB AB Welding Equipment, Sweden	Friction stir welding of high-strength aluminium alloys using an industrial robot system: A feasibility study
1610-1635	F Marie ¹ , B Guerin ¹ , D Deloison ¹ , D Aliaga ¹ , C Desrayaud ²	¹ EADS Innovation Works; ² Ecole Nationale Supérieure des Mines de Saint-Etienne, Centre SMS, Laboratoire PECM, France	Investigation on bobbin tool friction stir welding of 2000 serie aluminium thin sheets
1635-1700	L Dubourg , R Amargier, M Jahazi	Aerospace Manufacturing Technology Centre, Institute for Aerospace Research, National Research Council, Canada	Relationship between FSW parameters, hardness and tensile properties of 7075-T6 and 2098-T851 similar butt welds.
	Session 8B: Mechanical Properties	Chairmen: Masaki Kumagai – Guohong Luan	
1520-1545	J Altenkirch ^{1,2} , A Steuwer ^{3,4} , M Peel ⁵ , P J Withers ¹ ,	¹ Manchester Materials Science Centre, University of Manchester, UK ; ² Institut Laue-Langevin, France ; ³ FaME38 at the ILL-ESRF, France ; ⁴ ESS Scandinavia Secretariat, Sweden ; ⁵ ESRF, France	Residual stress minimization by in-situ global mechanical tensioning in friction stir welds of high strength aluminium alloys
1545-1610	C A Widener , B M Tweedy, D A Burford	National Institute for Aviation Research, Wichita State University, USA	An investigation of the effects of tool design and welding parameters on fatigue life in friction stir welded 2024-T3

1610-1635	R Sandström , M M Shahri,	Department of Material Science and Engineering, Royal Institute of Technology (KTH), Sweden	Fatigue strength of friction stir welded aluminium profile for train car application
1635-1700	T Okada ¹ , M. Suzuki ² , H. Miyake ² , T. Nakamura ¹ , S. Machida ¹ , M. Asakawa ³	¹ Japan Aerospace Exploration Agency; ² Graduate Student, Waseda University; ³ Waseda University, Japan	Evaluation of properties for friction stir welded butt joint in 2024-T3 aluminium alloy
1900-2200	Social event		
Thursday 22nd May			
Session 9A: Dissimilar Materials		Chairmen: Shinji Kumai / Laurent Dubourg	
0830-0855	Y C Chen , K Nakata	Joining and Welding Research Institute, Osaka University, Japan	Friction stir reaction diffusion welding of AC4C cast aluminium alloy and AZ31 magnesium alloy
0855-0920	S Bozzi ^{1,2} , A L Etter ^{1,2} , T Baudin ^{2,1} , V. Klosek ³ , B Criqui ⁴ , J G Kerbiguet ⁴	¹ Université Paris-Sud; ² CNRS, UMR8182, ICMO, Laboratoire de Physico-Chimie de l'Etat Solide; ³ Laboratoire Léon Brillouin (CEA-CNRS); ⁴ Technocentre Renault Guyancourt, France	The parameters influencing the mechanical properties of friction stir spot welds between 6016 aluminium alloy and HSLA steel
0920-0945	E Theado , E Ivanov	Tosoh SMD Inc. USA	High strength target assembly using FSW of dissimilar aluminium AA7075 and Al-0.5%Cu alloys
0945-1010	A Kostka ¹ , R Coelho ¹ , J dos Santos ² , A R Pyzalla ¹ ,	¹ Max-Planck-Institut für Eisenforschung GmbH; ² GKSS Research Centre GmbH, Germany	Microstructure and properties of Al to steel friction stir overlap welds
Session 9B: Steel 3		Chairmen: Yutaka Sato / Jorge dos Santos	
0830-0855	R Ayer ¹ , D P Fairchild ² , S J Ford ² , N E Nissley ² , H.W. Jin ¹ , A Ozekcin ¹	¹ ExxonMobil Research and Engineering Company; ² ExxonMobil Upstream Research Company, USA	Friction stir welding study of linepipe steels
0855-0920	X Wu ¹ and A Kumar ² (presented by R Ayer ¹)	¹ ExxonMobil R&D Company; ² ExxonMobil Upstream Research Co, USA	3D finite element modelling of thermo-mechanical conditions during friction stir welding of steel.
0920-0945	T Weinberger ^{1,2} , S Khosa ^{1,2} , B. Führer ^{1,2} , N Enzinger ^{1,2}	¹ JOIN – Network of Excellence for Joining; ² Institute for Materials Science, Welding and Forming, Graz University of Technology, Austria	Analysis of tool wear and failure mechanism during friction stir welding of steel
0945-1010	T Nelson ¹ , C Sorensen ¹ , S Packer ² , C Allen ³	¹ Friction Stir Research Laboratory, Brigham Young University; ² MegaStir Technologies; ³ DiamondBlade LLC, USA	Qualification of friction stir processing for production applications

1010-1035	Coffee Break		
	Session 10A: Process/Control 4	Chairmen: Kenichi Kamimuki / Bruno de Meester	
1035-1100	E F Schultz ¹ , F E Pfefferkorn ¹ , C B Smith ² , M Zinn ¹ , N J Ferrier ¹	¹ Department of Mechanical Engineering, University of Wisconsin-Madison; ² Friction Stir Link Inc, USA	Towards a man-machine interface for flexible friction stir welding
1100-1125	D A Burford , B M Tweedy, C A Widener	National Institute for Aviation Research, Wichita State University, USA	Development of design data for FSW and FSSW
1125-1150	H Fujii , K Kitamura, M Kamai, T Matsumoto, K Nogi	Joining and Welding Research Institute, Osaka University, Japan	Porosity formation in FSW weld by post arc welding and two methods for suppression
1150-1215	F Gratecap , C Racineux , S Marya	Institut de Recherche en génie civil et mécanique (GeM), France	A simple methodology to define conical tool geometry and welding parameters in friction stir welding
	Session 10B: Titanium	Chairmen: Masahiko Ikeda / Gil Sylva	
1035-1100	O Lorrain ¹ , V Favier ¹ , H Zahrouni ¹ , M El Hadrouz ²	¹ LPMM UMR CNRS 7554 Ars et Metiers Paris Tech; ² LIM UMR CNRS 8006 Arts et Metiers Paris Tech ; ³ LPMM UMR CNRS 7554 Université de Metz, France	A critical analysis of FSW simulations
1100-1125	C Dong , G Li, X Gu, G Luan,	China FSW Centre, China	FSW of hydrogenated titanium alloy
1125-1150	M J Russell, M E Nunn, J Martin	TWI Ltd., UK	Recent developments in the stationary shoulder FSW of titanium alloys
1150-1215	B P Wynne ¹ , P L Threadgill ² , P S Davies ¹ , M J Thomas ¹ , B S Ng ¹	¹ Institute for Microstructural and Mechanical Processing Engineering, University of Sheffield; ² TWI Ltd, UK	Microstructure and texture in static shoulder friction stir welds of Ti-6Al-4V
1215-1315	Lunch		
	Session 11A: Spot 3 (Al)	Chairmen: Takafumi Nakanishi / Alberto Echeverria	
1315-1340	H Badarinarayan ¹ , Q Yang ¹ , F Hunt ¹ , K Okamoto ² ,	¹ Hitachi America Ltd, USA ; ² Hitachi Ltd, Japan	Effect of pin geometry on the joint strength of friction stir spot welded aluminium alloys
1340-1405	D Bakavos , P B Prangnell	Materials Science Centre, School of Materials, University of Manchester, UK	Effect of the pin length and the anvil insulation on friction stir spot welding thin gauge 6111 automotive sheet
1405-1430	B Tweedy , C A Widener, S F Jurak, D A Burford	National Institute for Aviation Research at the Wichita State University, USA	Effects of weld tool design and welding parameters on swept friction stir spot welding in thin gauge aluminium
1430-1455	M Fujimoto ¹ , D Watanabe ¹ , N Abe ² , Y S Sato ² , H Kokawa ²	¹ Manufacturing Technology Department, System Technology Development Center, Kawasaki Heavy Industries Ltd;	Analysis of the stir zone produced by friction stir spot joining

		² Department of Materials Processing, Graduate School of Engineering, Tohoku University, Japan	
Session 11B: Modelling 2		Chairmen: Kazutaka Okamoto / Tracy Nelson	
1315-1340	M Posada	Naval Surface Warfare Center, Carderock Division, USA	Characterization and comparison of controlled thermomechanical tests and actual friction stir welds
1340-1405	D Deloison, F Marie , B Guerin, B Journet	EADS Innovation Works, France	Multi-physics modelling of bobbin-tool friction stir welding – simulation and experiments
1405-1430	K J Colligan	Concurrent Technologies Corporation, USA	A proposed conceptual model of the process variables related to heat generation in friction stir welding of aluminium
1430-1455	C C Tutum , H N B Schmidt, J H Hattel	Department of Mechanical Engineering, Technical University of Denmark, Denmark	Assessment of benchmark cases for modelling of residual stresses and distortions in friction stir welding
END OF SYMPOSIUM			

POSTER SESSION			
Y Chen ^{1,2} , J Feng ¹ , H Liu ¹ ,	¹ National Key Laboratory of Advanced Welding Production Technology, Harbin Institute of Technology, China ; ² Joining and Welding Research Institute, Osaka University, Japan	Grain growth procedure of weld zone grains structure in Al alloy friction stir welds during solution treatment	
T Kawamoto ¹ , M Ueda ² , M Ikeda ²	¹ Graduate student of Kansai University; ² Faculty of Chemistry, Materials and Bioengineering, Kansai University, Japan	Microstructure and heat treatment behaviour of friction stir welded titanium plate	
D Lu ^{1,2} , S Barnes ¹ , R Johnson ³ , P J Withers ¹	¹ Materials Science Centre, School of Materials, University of Manchester, UK ; ² School of Electro & Mechanical Technology, Kunming University of Science and Technology, China ; ³ TWI Ltd., UK	Comparison between friction stir welding of AZ31 and AZ91 in conditions of low rotation speed	
C Peng, G Luan , X Guo, S Wang	China FSW Center Beijing FSW Technology Co Ltd., China	Research on the FSW of Thick Aluminium	
A Sullivan ¹ , I Horsfall ² , J D Robson ¹ , P B Prangnell ¹	¹ University of Manchester, School of Materials, Materials Science Centre; ² Engineering Systems Department, Cranfield University, Royal Military College of Science, UK	Ballistic performance of friction stir weld zones in high strength 7xxx aluminium alloys	
D Gesto ¹ , V. Pintos ¹ , J Vazquez ¹ , J Rasilla ² , S. Barreras ²	¹ AIMEN; ² AISTER S.A. Aluminium Shipyard, Spain	6082 T6 aluminium alloy welded by FSW and GMAW processes for marine applications – A comparative study	
I J Smith , D R Lord	TWI Ltd., UK	FSW patents - A stirring story	
G Voellner, M F Zaeh	Institute for Machine Tools and Industrial Management (iwb),	Influence of machine types on FSW seam qualities	

(presented by P Gebhard)	Technische Universität Muenchen, Germany	
D Levesque ¹ , C.Mandache ² , L Dubourg ² , P Gougeon ¹	¹ Industrial Materials Institute, National Research Council Canada; ² Institute for Aerospace Research, National Research Council Canada, Canada	Detectability of FSW defects with NDE methods
L I Kiss , L St-Georges, E de Varennes	Université du Québec à Chicoutimi, Canada	Tool-material interface in friction stir welding
M Assidi , S Guerdoux, L Fourment	CEMEF, France	3D accurate finite element simulation of various friction stir welding phases: Plunging, dwelling, welding
H Liu ¹ , L Zhou ¹ , P Liu ¹ , H Fujii ²	¹ State Key Laboratory of Advanced Welding Production Technology, Harbin Institute of Technology, China ; ² Joining and Welding Research Institute, Osaka University, Japan	Friction stir welding of thermohydrogen processed titanium alloy
Y Morisada ¹ , H Fujii ² , T Nagaoka ¹ M Fukusumi ¹	¹ Osaka Municipal Technical Research Institute; ² Joining and Welding Research Institute, Osaka University, Japan	Magnesium alloy based surface composites fabricated by friction stir processing
D Kim ¹ , H Badarinarayan ² , K Chung ¹	¹ Department of Materials Science and Engineering, College of Engineering, Seoul National University, Korea ; ² Hitachi America Ltd, USA	Thermo-mechanical modelling of friction stir butt welding process of AA5083-H18 – CFD modelling with steady state description
A K Shukla ¹ , S S Babu ² , J Bernath ¹	¹ EWI; ² The Ohio State University, USA	Orientation imaging microscopy of friction stir welded Ti-6Al-4V