

## Programme for 5<sup>th</sup> International FSW Symposium - Metz, France - 14-16 Sept 2004

<b>Session 01 - Process Developments</b>	
A feasibility study for self reacting pin tool welding of thin section aluminium	G Sylva*, R Edwards*, T Sassa** - *MTS Systems Corp, **Nippon Sharyo Ltd
Development of the bobbin tool technique on various aluminium alloys	F Marie, D Allehaux, B Esmiller - EADS
<b>Session 02A - Modelling/Metallurgy</b>	
Modelling friction stir welding with the finite element method - a comparative study	R W McCune, H Ou, C G Armstrong, M Price - The Queen's University of Belfast
Thermomechanical and microstructural modelling of the friction stir welding process	Ch Desrayaud*, P Heurtier*, D Allehaux**, F Montheillet* - *ESME, **EADS CCR
Improved verification of FSW-process modelling relating to the origin of material plasticity	F Palm*, U Henneböhle*, V Erofeev**, E Karpuchin**, O Zaitzev** - *EADS, **IFA Centrum
<b>Session 02B - Applications (Automotive and Aerospace)</b>	
Friction stir welding for the 21 <sup>st</sup> Century automotive industry	J F Hinrichs, C B Smith, B F Orsini, R J DeGeorge, B J Smale, P C Ruehl, - Friction Stir Link, Inc
Friction stir welding of complex curvature airframe structures. <i>(This manuscript is not available)</i>	R Talwar*, J Baumann*, R Lederich*, L Pionke*, M Matlack*, D Bolser*, W Arbegast**, C Allen** - *Boeing, **South Dakota School of Mines
On the formability of friction stir welded aluminium tailored welded blanks	S Sheikhi* J F dos Santos*, S Lösch** - *GKSS, **ThyssenKrupp Umformtechnik GmbH
<b>Session 03A - Metallurgy/Microstructure/Corrosion</b>	
Localised corrosion of friction stir welds in aluminium alloys	B J Connolly*, A J Davenport*, M Jariyaboon*, C Padovani*, R Ambat*, S W Williams**, D A Price**, A Wescott**, C Goodfellow*/**, C-M Lee*** - *University of Birmingham, **BAE Systems, ***TWI Ltd
Characterisation of the microstructural evolution during friction stir welding of aluminium alloys: a comparative study of 5251 and 2024 alloys	C Genevois*, A Deschamps*, A Denquin** - *LTPCM, **ONERA
Wear behaviour of hard alloy tools in the friction stir welding of AC4A+30vol.%SiCp aluminum matrix composite	H J Liu*/**, H Fujii*, K Nogi* - *Osaka University, **Harbin Institute of Technology
<b>Session 03B - Non-Destructive Testing</b>	
The inspection of friction stir welded aluminium plant	C R Bird - TWI Ltd
Non destructive detection of flaws in FSW and their metallographic characterization	T Vugrin, G Staniek, W Hilliger, C Dalle Donne - DLR
Portable array multi-techniques instrument for the inspection of FSW. <i>(This manuscript is not available)</i>	A Lamarre, O Dupuis, M Grenier - R/D Tech
<b>Session 04A - Metallurgy/Microstructure</b>	
Grain growth in friction stir welded Al alloy 1100 during post weld heat treatment	Y S Sato, H Watanabe, S H C Park, H Kokawa - Tohoku University
Friction stir welding of aluminium cast alloy	G Luan, Y Wang, Y Ji, C Sun - China FSW Center
<b>Session 04B - Process Developments</b>	
Development of micro-FSW	T Nishihara, Y Nagasaka - Kokushikan University
Friction stir welding of ultrafine grained materials	H Fujii, Y Takada, N Tsuji, K Nogi - JWRI, Osaka Univ
A study of friction stir processing tool designs for microstructural modifications as demonstrated in aluminum fusion welds	C Fuller, M Mahoney, W Bingel - Rockwell Scientific
<b>Session 05A - Applications</b>	
Production of nuclear fuel plates using friction stir welding	C R Clark - Argonne National Laboratory
5 axis FSW gantry machine for defense, aerospace and general applications	J Thompson - GTC
Friction stir welding serial production of aluminium drying trays for the food industry	A Meyer, C Schilling - RIFTEC
<b>Session 05B - Copper Alloys/Magnesium Alloys</b>	
Friction stir weldability of copper alloys	K Savolainen*, J Mononen*, T Saukkonen, H Hänninen*, J Koivula** - *Helsinki University of Technology, **Outokumpu Poricopper
FSW to seal 50mm thick copper canisters - a weld that lasts for 100,000 years	L Cederqvist - Swedish Nuclear Fuel and Waste Management Co (SKB)
Microstructure and mechanical properties of friction stir welded Mg alloy AZ91	P Volovitch*/**, J-E Masse*, T Baudin**, B Da Costa***, J C Goussain***, W Saikaly****, L Barrallier* - *MécaSurf ENSAM, **Université de Paris Sud, ***Institut de Soudure, ****CP2M
<b>Session 06A - Steel</b>	
Innovative technology applications in FSW of high softening temperature materials	C D Sorensen*, T W Nelson*, S M Packer**, R J Steel**, *Brigham Young University, **MegaStir Technologies
Mechanical properties of friction stir welding joint for mild steel	M Hirakawa, H Yamamoto, T Shinoda, H Takegami - Hitachi
Metallurgical and mechanical properties of friction stir welded ultra fine grained steel	S Hirano, K Okamoto, K Aota, M Inagaki - Hitachi

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<b>Session 06B - Mechanical Properties</b>	
Effect of friction stir welding process parameters on the mechanical properties of the as-welded and post-weld heat treated AA2095	M M Attallah*, H G Salem** - *University of Birmingham, **American University in Cairo
Fatigue of FSW overlap joints in aluminium welded with different tool designs	M Ericsson, R Sandström - Royal Institute of Technology (KTH)
Properties of friction stir welded joints in the aluminium alloys 2024, 5083, 6082/6060 and 7075	J Klæstrup Kristensen*, C Dalle Donne**, T Ghidini**, J T Mononen†, A Norman‡, A Pietras††, M J Russell‡, S Slater‡‡ - *Force Technology, **DLR, †Helsinki Technical University, ††Instytut Spawalnictwa, ‡TWI Ltd, ‡‡Corus
<b>Session 07A - Steel</b>	
Butt welding between dissimilar metals by friction stirring	M Fukumoto*, T Yasui*, Y Shimoda*, M Tsubaki*, T Shinoda** - *Toyohashi University, **Nagoya Univ
Effect of microstructure on corrosion of friction stir welded 304 stainless steel	S H C Park*, Y S Sato*, H Kokawa*, K Okamoto**, S Hirano**, M Inagaki** - *Tohoku Univ, **Hitachi
Friction stir welding between aluminium and steel with high welding speed	T Yasui*, T Ishii*, Y Shimoda*, M Tsubaki*, M Fukumoto*, T Shinoda** - *Toyohashi Univ, **Nagoya Univ
<b>Session 07B - Metallurgy/Microstructure</b>	
An overview of friction stir welding Beta 21S titanium	Z Loftus*, J Takeshita*, A Reynolds**, W Tang** - *Lockheed Martin Space Systems, **University of South Carolina
Formation of weld zones during friction stir welding of aluminium alloys	Z W Chen, R Maginness - Auckland University of Technology
Process-structure-property relationship for nugget and HAZ region of AA2524-T351 FSW joints	J Yan, M A Sutton, A P Reynolds - University of South Carolina
<b>Session 08A - Modelling</b>	
Modelling the relationship between process parameters, microstructural evolutions and mechanical behaviour in a friction stir welded 6xxx aluminium alloy	C Gallais*, A Denquin*, A Pic*, A Simar**, T Pardoent†, Y Brechet‡ - *ONERA, **PRM, †IMAP, ‡LTPCM/INPG
Fundamental characterization of friction stir welding	J H Record, J L Covington, T W Nelson, C D Sorensen, B W Webb - Brigham Young University
Microstructural development and modelling in friction stir welds of strain-hardenable Al alloys	M Strangwood, C L Davis, M M Attallah - University of Birmingham
<b>Session 08B - Metallurgy/Microstructure</b>	
Texture and grain evolutions in a 2195 friction stir weld	R W Fonda*, J F Bingert**, K J Colligan† - *US Naval Research Lab, **Los Alamos National Lab, †CTC
Microstructural evolution during friction stir welding of AA7449	J D Robson*, A Sullivan*, H R Shercliff**, G McShane** - *Manchester Materials Science Centre, **Cambridge University Engineering Department
Friction stir welding in large 6063 Al extrusions manufacturing	G Luan*, S Lin**, P Chai*, H Li* - *China FSW Center, **Harbin Institute of Technology
<b>Session 09A - Dissimilar Materials</b>	
Characteristics of microstructure in dissimilar FSW joints of 5083/6061 Al alloys	T Shinbayanagi, M Maeda - JWRI
Fatigue and corrosion properties of friction stir welded dissimilar aluminium alloys	U A Mercado, T Ghidini, C Dalle Donne, R Braun - DLR
Friction stir welding of dissimilar alloys for aircraft	H Gérard, J C Ehrström - Alcan
<b>Session 09B - Modelling</b>	
Numerical simulation of the friction stir welding process using both Lagrangian and arbitrary Lagrangian Eulerian formulations	L Fourment*, S Guerdoux*, M Miles**, T Nelson** - *CEMEF, Ecole des Mines de Paris, **Brigham Young University
Modelling thermomechanical conditions at the tool/matrix interface in friction stir welding	H Schmidt, J Hattel - *Technical University of Denmark
Prediction of residual stresses and property distributions in friction stir welds of aluminium alloy 6061-T6. <i>(This manuscript is not available)</i>	Z Feng, X-L Wang, S David, P Sklad - Oak Ridge National Laboratory
<b>Session 10A - Process Developments</b>	
Development of the Trivex™ friction stir welding tool for making lap welds	P A Colegrove*/**, H R Shercliff**, T Hyoe** - *TWI Ltd, **University of Cambridge
Friction stir welding of complex curvature parts using rapid configurable tooling	W J Arbegast, C D Allen - South Dakota School of Mines and Technology
A study on material flow in FSW of AA 2024-T351 and AA 6056-T4 alloys	R Zettler*, S Lomolino*, J F dos Santos*, T Donath*, F Beckmann*, T Lippman*, D Lohwasser** - *GKSS, **Airbus Deutschland
<b>Session 10B - Modelling</b>	
Finite element modelling of friction stir welding on copper canister	T Källgren, L-Z Jin, R Sandström - Royal Institute of Technology
Influence of friction stir welding parameters on the power input and temperature distribution in aluminium alloys	A Simar*/**, T Pardoent**, B de Meester* - *PRM, **IMAP
Modelling the friction stir welding of aerospace alloys	P A Colegrove, H R Shercliff - University of Cambridge

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Session 11A - Friction Stir Spot Welding and Modelling	
Spot friction welding for sheet aluminium joining	T-Y Pan*, A Joaquin*, D E Wilkosz*, L Reatherford*, J M Nicholson*, Z Feng**, M L Santella** - *Ford Motor Company, **Oak Ridge National Laboratory
Friction stir spot welding - principal parameters and their effects	A C Addison, A J Robelou - TWI Ltd
Inverse analysis using a genetic algorithm for the finite element modelling of friction stir welding	T De Vuyst*, L D'Alvise*, A Simar**, B de Meester**, S Pierret* - *CENAERO, **UCL-PRM
Session 11B - Process Developments	
Friction stir welding with modern milling machines/ requirements, approach and application	M F Zaeh, D Eireiner, L Papadakis - IWB
Examination of material flow in thick section friction stir welding of aluminum using a stop-action technique	K J Colligan, S K Chopra - Concurrent Technologies Corporation
Comparison of the mechanical and corrosion behaviour between friction stir welded joints and MIG welded joint in 7020 aluminium alloy	R Perinet*, J C Goussain**, B Da Costa** - *GIAT Industries, **Institut de Soudure