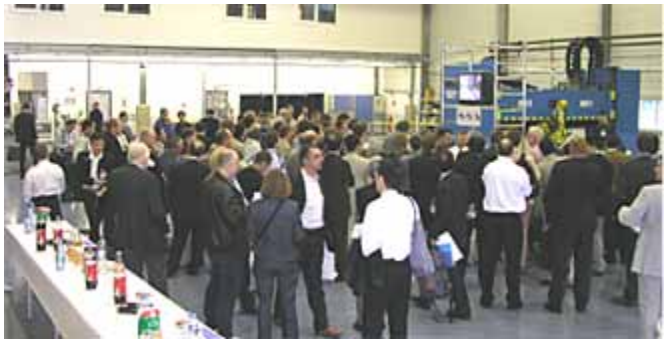
5th International Symposium on Friction Stir Welding (5IFSWS)
Metz, France
14-16 September 2004

The 5th International Friction Stir Welding Symposium attracted 186 attendees, a record for this event, and 61 papers were presented on a variety of topics associated with friction stir welding.

Delegates came from 23 countries from every inhabited continent of the world, including delegates from as far as New Zealand and Australia, South Africa, Brazil and China for the first time, as well as strong delegations from North America, Europe and Japan. Much of the success was due to the hard work done by our co-hosts, the Institut de Soudure.

The importance of this event was underlined by the association of several other events with the Symposium.

Many of the delegates took the opportunity to visit the Institut de Soudure's nearby friction stir welding laboratory, where their two machines were on show, and demonstrated.



Photograph courtesy of Institut de Soudure

5TH INTERNATIONAL SYMPOSIUM ON FSW - FRANCE (14-16 SEPTEMBER 2004)

Session	Author	Paper
Session 1: PROCESS DEVELOPMENTS		
	G Sylva, R Edwards and T Sassa	A feasibility study for self reacting pin tool welding of thin section aluminium
	F Marie, D Allehaux and B Esmiller	Development of the bobbin tool technique on various aluminium alloya
Session 2A: MODELLING/METALLURGY		
	R W McCune, H Ou, C G Armstrong and M Price	Modelling friction stir welding with the finite element method - a comparative study
	Ch Desrayaud, P Heurtier, D Allehaux and F Montheillet	Thermomechanical and microstructural modelling of the friction stir welding process
	F Palm, U Henneböhle, V Erofeev, E Karpuchin, O Zaitzev	Improved verification of FSW-process modelling relating to the origin of material plasticity
Session 2B: APPLICATIONS (AUTOMOTIVE AND AEROSPACE)		
	J F Hinrichs, C B Smith, B F Orsini, R J DeGeorge, B J Smale and P C Ruehl,	Friction stir welding for the 21st Century automotive industry
	R Talwar, J Baumann, R Lederich, L Pionke, M Matlack, D Bolser, W Arbegast, C Allen	Friction stir welding of complex curvature airframe structures (This manuscript is not available)
	S Sheikhi J F dos Santos and S Lösch	On the formability of friction stir welded aluminium tailored welded blanks
Session 3A: METALLURGY/MICROSTRUCTURE/CORROSION		
	B J Connolly, A J Davenport, M Jariyaboon, C Padovani, R Ambat, S W Williams, D A Price and A Wescott, C Goodfellow and C-M Lee	Localised corrosion of friction stir welds in aluminium alloys
	C Genevois, A Deschamps, A Denquin	Characterisation of the microstructural evolution during friction stir welding of aluminium alloys: a comparative study of 5251 and 2024 alloys
	H J Liu, H Fujii, K Nogi	Wear behaviour of hard alloy tools in the friction stir welding of AC4A+30vol.%SiCp aluminum matrix composite
Session 3B: NON-DESTRUCTIVE TESTING		
	C R Bird	The inspection of friction stir welded aluminium plant
	T Vugrin, G Staniek, W Hilliger, C Dalle Donne	Non destructive detection of flaws in FSW and their metallographic characterization
	A Lamarre, O Dupuis, M Grenier	Portable array multi-techniques instrument for the inspection of FSW. (This manuscript is not available)
Session 4A: METALLURGY/MICROSTRUCTURE		
	Y S Sato, H Watanabe, S H C Park, H Kokawa	Grain growth in friction stir welded Al alloy 1100 during post weld heat treatment
	Luan, Y Wang, Y Ji, C Sun	Friction stir welding of aluminium cast alloy
Session 4B: PROCESS DEVELOPMENT		
	T Nishihara, Y Nagasaka	Development of micro-FSW
	H Fujii, Y Takada, N Tsuji, K Nogi	Friction stir welding of ultrafine grained materials
	C Fuller, M Mahoney, W Bingel	A study of friction stir processing tool designs for microstructural modifications as demonstrated in aluminum fusion welds
Session 5A: APPLICATIONS		
	C R Clark	Production of nuclear fuel plates using friction stir welding
	J Thompson	5 axis FSW gantry machine for defense, aerospace and general applications
	A Meyer and C Schilling	Friction stir welding serial production of aluminium drying trays for the food industry
Session 5B: COPPER ALLOYS/MAGNESIUM ALLOYS		
	K Savolainen, J Mononen, T Saukkonen, H Hänninen, J Koivula	Friction stir weldability of copper alloys
	L Cederqvist	FSW to seal 50mm thick copper canisters - a weld that lasts for 100,000 years
	P Volovitch, J-E Masse, T Baudin, B Da Costa, J C Goussain, W Saikaly, L Barrallier	Microstructure and mechanical properties of friction stir welded Mg alloy AZ91

Session 6A: STEEL		
	C D Sorensen, T W Nelson, S M Packer, R J Steel,	Innovative technology applications in FSW of high softening temperature materials
	M Hirakawa, H Yamamoto, T Shinoda, H Takegami	Mechanical properties of friction stir welding joint for mild steel
	Hirano, K Okamoto, K Aota, M Inagaki	Metallurgical and mechanical properties of friction stir welded ultra fine grained steel
Session 6B: MECHANICAL PROPERTIES		
	M M Attallah, H G Salem	Effect of friction stir welding process parameters on the mechanical properties of the as-welded and post-weld heat treated AA2095
	M Ericsson, R Sandström	Fatigue of FSW overlap joints in aluminium welded with different tool designs
	J Klæstrup Kristensen, C Dalle Donne, T Ghidini, J T Mononen, A Norman, A Pietras, M J Russell, S Slater	Properties of friction stir welded joints in the aluminium alloys 2024, 5083, 6082/6060 and 7075
Session 7A: STEEL		
	M Fukumoto, T Yasui, Y Shimoda, M Tsubaki, T Shinoda	Butt welding between dissimilar metals by friction stirring
	S H C Park, Y S Sato, H Kokawa, K Okamoto, S Hirano, M Inagaki	Effect of microstructure on corrosion of friction stir welded 304 stainless steel
	T Yasui, T Ishii, Y Shimoda, M Tsubaki, M Fukumoto, Shinoda	Friction stir welding between aluminium and steel with high welding speed
Session 7B: METALLURGY/MICROSTRUCTURE		
	Z Loftus, J Takeshita, A Reynolds, W Tang	An overview of friction stir welding Beta 21S titanium
	Z W Chen, R Maginness	Formation of weld zones during friction stir welding of aluminium
	J Yan, M A Sutton, A P Reynolds	Process-structure-property relationship for nugget and HAZ region of AA2524-T351 FSW joints
Session 8A: MODELLING		
	C Gallais, A Denquin, A Pic, A Simar, T Pardoen, Y Brechet	Modelling the relationship between process parameters, microstructural evolutions and mechanical behaviour in a friction stir welded 6xxx aluminium alloy
	J H Record, J L Covington, T W Nelson, C D Sorensen, B W Webb	Fundamental characterization of friction stir welding
	M Strangwood, C L Davis, M M Attallah	Microstructural development and modelling in friction stir welds of strain-hardenable Al alloys
Session 8B: METALLURGY/MICROSTRUCTURE		
	R W Fonda, J F Bingert, K J Colligan	Texture and grain evolutions in a 2195 friction stir weld
	J D Robson, A Sullivan, H R Shercliff,G McShane	Microstructural evolution during friction stir welding of AA7449
	G Luan, S Lin, P Chai, H Li	Friction stir welding in large 6063 Al extrusions manufacturing
Session 9A: DISSIMILAR MATERIALS		
	T Shinbayanagi, M Maeda	Characteristics of microstructure in dissimilar FSW joints of 5083/6061 Al alloys
	U A Mercado, T Ghidini, C Dalle Donne, R Braun	Fatigue and corrosion properties of friction stir welded dissimilar aluminium alloys
	H Gérard, J C Ehrström	Friction stir welding of dissimilar alloys for aircraft
Session 9B: MODELLING		
	L Fourment, S Guerdoux, M Miles, T Nelson	Numerical simulation of the friction stir welding process using both Lagrangian and arbitrary Lagrangian Eulerian formulations
	H Schmidt, J Hattel	Modelling thermomechanical conditions at the tool/matrix interface in friction stir welding
	Z Feng, X-L Wang, S David, P Sklad	Prediction of residual stresses and property distributions in friction stir welds of aluminium alloy 6061-T6. (This manuscript is not available)
Session 10A: PROCESS DEVELOPMENTS		
	P A Colegrove, H R Shercliff, T Hyoe	Development of the Trivex□ friction stir welding tool for making lap welds
	W J Arbegast, C D Allen	Friction stir welding of complex curvature parts using rapid configurable tooling
	R Zettler, S Lomolino, J F dos Santos, T Donath, F Beckmann,T Lippman, D Lohwasser	A study on material flow in FSW of AA 2024-T351 and AA 6056-T4 alloys Modelling
Session 10B: MODELLING		
	T Källgren, L-Z Jin, R Sandström	Finite element modelling of friction stir welding on copper canister
	Simar, T Pardoen, B de Meester	Influence of friction stir welding parameters on the power input and temperature distribution in aluminium alloys
	Colegrove, H R Shercliff	Modelling the friction stir welding of aerospace alloys
Session 11A: FRICTION STIR SPOT WELDING AND MODELLING		
	T-Y Pan, A Joaquin, D E Wilkosz, L Reatherford,JM Nicholson, Z Feng, M L Santella	Spot friction welding for sheet aluminium joining
	A C Addison, A J Robelou	Friction stir spot welding - principal parameters and their effects
	T De Vuyst, L D'Alvise, A Simar, B de Meester, S Pierret	Inverse analysis using a genetic algorithm for the finite element modelling of friction stir welding
Session 11B: PROCESS DEVELOPMENTS		
	M F Zaeh, D Eireiner, L Papadakis	Friction stir welding with modern milling machines/ requirements, approach and application
	K J Colligan, S K Chopra	Examination of material flow in thick section friction stir welding of aluminum using a stop-action technique
	R Perinet, J C Goussain, B Da Costa	Comparison of the mechanical and corrosion behaviour between friction stir welded joints and MIG welded joint in 7020 aluminium alloy

Proceedings

The proceedings of this highly successful symposium are available on CD-ROM. The papers presented provided an overview of the current state of the art., presenting novel work, some incremental, but some reporting significant advances in technology and applications.

The CD is also available from the Library at TWI Ltd. Please contact library@twi.co.uk
(Tel: +44 (0)1223 899000, Fax: +44 (0)1223 892588).

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