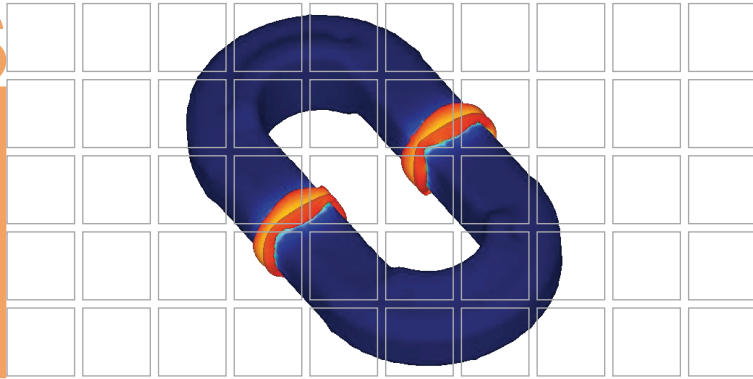


Institute of Materials Science and Welding
Univ.-Prof. Dipl.-Ing. Dr.techn. Christof Sommitsch



FINAL PROGRAMME

11th International Seminar
Numerical Analysis of Weldability
27 - 30 September 2015

Graz - Seggau - Austria

IIW Commission IX
WG Mathematical Modelling of Weld Phenomena



11th International Seminar Numerical Analysis of Weldability Chairman: C. Sommitsch Co-Chairmen: N. Enzinger, P. Mayr Honorary Chairman: H. Cerjak

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With the 11th International Seminar „Numerical Analysis of Weldability“, a tradition of successful meetings will be continued. Since the first of these events in 1991, this seminar series has developed to be a world leading conference in the growing field of the development of methods for predicting the microstructure and properties of welds. It is both, of practical importance and academic interest and it supports the philosophy of computer modelling, which helps to optimise welding processes and consumables as well as the service behaviour of welded components. Leading experts in this field attend the seminar and present their latest results in the calm atmosphere of an ancient castle.

The seminar is organized by the Institute of Materials Science and Welding of Graz University of Technology under the patronage of IIW Commission IX, Working Group „Mathematical Modelling of Weld Phenomena“.

The peer-reviewed papers will be published in the form of a book containing in-depth articles. Previous books are available from:

Mathematical Modelling of Weld Phenomena 1 - 6

Institute for Materials 1993, 1995, 1997, 1998, 2001, 2002
Book 533, 594, 650, 695, 738, 784

Mathematical Modelling of Weld Phenomena 7- 10

Verlag der Technischen Universität Graz, 2005, 2007, 2010, 2013



For the sixth time at this seminar, the **IIW Kenneth Easterling Best Paper Award** will be awarded to the paper which represents „*the best contribution made over the three years preceding the award to the advancement of knowledge or practice in respect of the mathematical modelling of a welding phenomenon*“. The prize is sponsored by **Fronius International GmbH** and it is dedicated to the commemoration of Prof. Kenneth Easterling, the first co-chairman of this seminar series.


As in the previous seminars, the idea is to bring together the leading specialists in this research field and to exchange the state of the art of development and application of Numerical Analysis of Weldability. We try to do our best to assure a calm working atmosphere in a nice surrounding, accompanied by an attractive social programme.

All seminar attendees stay in *Schloss Seggau*, a nice remote castel in the wine area 40 km in the south direction of Graz. The discussion about the items presented in the seminar sessions can be continued during the common meals and the social events (reception, styrian evening, wine cellar visit etc.).

I wish you all a pleasant stay at *Schloss Seggau* and a successful and memorable seminar!

Christof Sommitsch

The programme at a glance

Sunday, 27 th September 2015	Arrival day	
	19:00	Welcome reception Special act: Music performance Dinner at Schloss Seggau
Monday, 28 th September 2015	08:15 - 08:30	Welcome address and introduction
	08:30 - 17:20	Presentations
	18:00	Bus departure to dinner location
	19:00	Knight's banquet in the great hall of Schloss Kornberg
Tuesday, 29 th September 2015	08:30 - 17:30	Presentations
	17:50 - 18:45	Guided tour through Schloss Seggau
	19:00	Wine tasting and styrian evening Best paper award ceremony: Award sponsored by 
Wednesday, 30 th September 2015	09:00 - 12:10	Presentations
	12:10 - 13:30	Lunch and end of the seminar

Scientific committee

Chairman:	Christof Sommitsch, Graz University of Technology - IWS, Austria
Vice Chairmen:	NorbertENZinger, Graz University of Technology - IWS, Austria Peter Mayr, Technische Universität Chemnitz - IFMT, Germany
Honorary Chairman:	Horst Cerjak, Graz University of Technology - IWS, Austria

Thomas Böllinghaus, BAM - Federal Institute for Materials Research and Testing Berlin, Germany
Jesper Hattel, Technical University of Denmark, Denmark
Toshihiko Koseki, The University of Tokyo, Japan
Ernst Kozeschnik, Vienna University of Technology, Austria
Tobias Loose, Ingenieurbüro Tobias Loose, Germany
Patricio F. Mendez, University of Alberta, Canada
Suck Joo Na, Department of Mechanical Engineering, KAIST, Republic of Korea
Jitai Niu, Henan Polytechnic University, P. R. China
Krishnaswamy Ravi-Chandar, The University of Texas at Austin, USA
Uwe Reisgen, RWTH Aachen University, Germany
Michael Rethmeier, Technische Universität Berlin, Germany
Ian M. Richardson, Delft University of Technology, The Netherlands
Gleb A. Turichin, Saint Petersburg State Polytechnical University, Russia

MONDAY, 28TH SEPTEMBER 2015

08:15 - 08:30: **Welcome address and introduction**
Chairman Christof Sommitsch

I Arc Welding, Melt Pool & Solidification

Chairman: Peter Mayr

08:30 - 08:55 **KEYNOTE**
Heat and mass flow in arc welding processes and its application to mechanical analysis of welded structures
S. J. NA, J. H. CHEON, D. V. KIRAN: Department of Mechanical Engineering, KAIST, Republic of Korea
D. W. CHO: Industrial Technology Institute, Hyundai Heavy Industries, Republic of Korea

08:55 - 09:15 **Process simulation of plasma arc welding for the development of an orbital plasma arc welding torch**
K. ALALUSS, G. BÜRKNER: Industrial Research & Engineering (IRE), Germany
P. MAYR: Institute of Joining and Assembly Technologies, Technische Universität Chemnitz, Germany

09:15 - 09:35 **Modelling large droplet oscillations during pulse gas metal arc welding**
R. MONIER: Centre technique Areva-NP, France
F. SOULIE, C. BORDREUIL: Laboratoire de Mécanique et Génie Civil, UMR5008, Université Montpellier, France
J. CHAPUIS, F. THUMEREL, P. GILLES: Centre technique Areva-NP, France

09:35 - 09:55 **The fine modification of double ellipsoid heat source**
U. REISGEN, A. SCHIEBAHN, O. MOKROV: RWTH Aachen University, ISF – Welding and Joining Institute, Germany

09:55 - 10:20 COFFEE BREAK

Chairman: Toshihiko Koseki

10:20 - 10:40 **Development of line-type heat source for finger type penetration in MIG welding**
H. SERIZAWA: Joining & Welding Research Institute, Osaka University, Japan
M. YOSHIYAMA, F. MIYASAKA: Graduate School of Engineering, Osaka University, Japan

10:40 - 11:00 **Simulation of non-equilibrium fusion welding using the discontinuous Galerkin method**
J. S. CAGNONE, K. HILLEWAERT, N. POLETZ: Cenaero, Belgium

11:00 - 11:20

Numerical simulation of coupled multiphysics phenomena in gas tungsten arc welding

M. C. NGUYEN: Atomic Energy Commission (CEA Saclay), France and Polytech' Marseille, France

O. ASSERIN, S. GOUNAND: Atomic Energy Commission (CEA Saclay), France

P. GILLES: AREVA NP, France

M. MEDALE: Polytech' Marseille, France

II Microstructure Modelling in WM and HAZ

Chairman: Toshihiko Koseki

11:20 - 11:45

KEYNOTE

Simulation of laser welding aluminum-to-steel

R. GÓMEZ VÁZQUEZ, A. OTTO, G. LIEDL, R. FEICHTENSCHLAGER, C. STIGLBRUNNER: Institute for Production and High Power Laser Technology, Vienna University of Technology, Austria

11:45 - 12:05

Prediction of phase transformation in duplex stainless steel welds

K. SAIDA: Dept. of Materials & Manufacturing Science, Osaka University, Japan

K. NISHIMOTO: Dept. of the Application of Nuclear Technology, Fukui University of Technology, Japan

H. INOUE: Nippon Steel & Sumitomo Metal Corporation, Japan

Y. OIKAWA: Nippon Steel & Sumikin Stainless Steel Corporation, Japan

12:05 - 12:25

Phase field modeling of the phase transformation in the coarse-grained heat-affected zone of large diameter linepipes

P. SCHAFFNIT, C. STALLYBRASS: Salzgitter Mannesmann Forschung GmbH, Germany

H. SCHAAR, I. STEINBACH: Interdisciplinary Center for Advanced Materials Simulation, Germany

J. SCHRÖDER: EUROPIPE GmbH, Germany

12:25 - 13:45

LUNCH

Chairman: Ernst Kozeschnik

13:45 - 14:05

Development of phase transformation and predication of crack location during weldability implant testing: numerical modeling

A. ALSHAWAF: Center for Welding, Joining, and Coating Research, Department of Metallurgical and Materials Engineering, Colorado School of Mines, USA and Saudi Arabian Basic Industrial Corporation SABIC, Kingdom of Saudi Arabia

S. LIU: Center for Welding, Joining, and Coating Research, Department of Metallurgical and Materials Engineering, Colorado School of Mines, USA

B. SHULA, V. KOMMINENI: Engineering System International Group - ESI Group, USA

14:05 - 14:25

A multi-physic CAFE approach for the simulation of grain structure development in GMAW processes

G. GUILLEMOT, O. DESMAISON, S. CHEN, M. BELLET, CH.-A. GANDIN: MINES ParisTech CEMEF UMR CNRS 7635, France

III Microstructure and Mechanical Properties

Chairman: Ernst Kozeschnik

14:25 - 14:50

KEYNOTE

Improved resistance spot weldability of 3rd generation AHSS for automotive applications

E. M. VAN DER AA: Tata Steel, The Netherlands

M. AMIRTHALINGAM: TU Delft, The Netherlands

J. WINTER, D. N. HANLON: Tata Steel, The Netherlands

M.J.M. HERMANS: TU Delft, The Netherlands

M. RIJNDERS: Tata Steel, The Netherlands

I.M. RICHARDSON: TU Delft, The Netherlands

14:50 - 15:10

An LS-DYNA material model for the consistent simulation of welding forming and heat treatment

T. LOOSE: Igenieurbüro Tobias Loose, Germany

T. KLÖPPEL: DYNAMore GmbH, Germany

15:10 - 15:30

Prediction of weld quality with expanded welding process analysis by SimWeld and WeldWare for GMA welding

T. LOOSE: Igenieurbüro Tobias Loose, Germany

O. MOKROV: ISF – Welding and Joining Institute RWTH Aachen, Germany

A. SCHARFF: SLV Mecklenburg-Vorpommern GmbH, Germany

U. REISGEN: ISF – Welding and Joining Institute RWTH Aachen, Germany

15:30 - 15:55

COFFEE BREAK

IV Residual Stresses & Distortion

Chairman: Suck Joo Na

15:55 - 16:20

KEYNOTE

Numerical simulation of narrow gap welding of a large thick plate

J. SCHLEYER: IMWF Universität Stuttgart, Germany

A. KLENK: MPA Universität Stuttgart, Germany

M. SEIDENFUSS: IMWF Universität Stuttgart, Germany

16:20 - 16:40

Effect of local stress state on fatigue strength of welded T-joints

M.J. OTTERSBOECK, M. LEITNER, M. STOSCHKA: Montanuniversität

Leoben, Chair of Mechanical Engineering, Austria

16:40 - 17:00

Influence of structural stiffness on the residual stresses during welding of low transformation temperature alloys

J. WEIDEMANN, J. DIXNEIT, A. KROMM, T. KANNENGIESSER: BAM

Federal Institute for Materials Research and Testing, Berlin, Germany

J. GIBMEIER: Karlsruhe Institute of Technology, Germany

17:00 - 17:20

Generalization of the equivalent inherent strain method applied for the welding of a formwork panel. Comparison with the shrinkage method and with experimental results for its validation

A. MENDIZABAL, E. GOROSTEGUI, M. SAN SEBASTIAN, A. ECHEVERRIA:

IK4-LORTEK, Technological Centre, Spain

18:00

Bus departure to dinner

TUESDAY, 29TH SEPTEMBER 2015

IV Residual Stresses & Distortion

Chairman: Norbert Enzinger

- 08:30 - 08:50 **The evolution of residual stresses in a stress relief heat treatment of test specimen of alloy 718**
J. STEFFENBURG-NORDENSTRÖM: University West Department of Engineering Science and GKN Aerospace, Sweden
- 08:50 - 09:10 **Large-scale residual stress analysis of multi-pass welded pipe joint using idealized explicit FEM accelerated by a GPU**
K. IKSUHIMA, M. SHIBAHARA: Osaka Prefecture University, Japan
- 09:10 - 09:30 **Numerical sensitivity analysis of TRIP-parameter K on weld residual stresses and distortion**
S. NEUBERT: Federal Institute for Materials Research and Testing (BAM) Berlin, 9.3 Welding Technology, Germany
- 09:30 - 09:50 **Welding simulation of aircraft engine large components**
F. PICHOT: SNECMA SAFRAN-GROUP, France
N. POLETZ: CENAERO, Belgium

V Cracking Phenomena

Chairman: Norbert Enzinger

- 09:50 - 10:15 **KEYNOTE**
Integrated modelling of crack propagation in AA2024-T3 FSW butt joints considering the residual stresses from the manufacturing process
M. R. SONNE: Department of Mechanical Engineering, Technical University of Denmark, Denmark
P. CARLONE, R. CITARELLA: Department of Industrial Engineering, University of Salerno, Italy
J. H. HATTEL: Department of Mechanical Engineering, Technical University of Denmark, Denmark

10:15 - 10:40 **COFFEE BREAK**

VI Hydrogen Effects

Chairman: Jesper Hattel

- 10:40 - 11:05 **KEYNOTE**
Modeling the influence of atomic traps on hydrogen diffusion and solubility in steel
P. LANG: Binder+Co AG, Austria
S. ZAMBERGER: voestalpine Stahl Donawitz GmbH, Austria
E. KOZESCHNIK: Christian Doppler Laboratory of Early Stages of Precipitation, Institute of Materials Science and Technology, Vienna

11:05 - 11:25

Numerical model for hydrogen diffusion in steels for power station application and influence of experimental conditions
C. MUENSTER: Institute for Failure Analysis and Failure Prevention ISSV e.V., c/o Helmut Schmidt University of the Federal Armed Forces Hamburg, Germany
T. MENTE, M. RHODE, T. BOELLINGHAUS: Federal Institute for Materials Research and Testing (BAM) Berlin, Germany

VII Solid State & Friction Stir Welding

Chairman: Jesper Hattel

11:25 - 11:50

KEYNOTE

Interfacial strength evolution mechanism in steel-to-steel solid state bonding at low temperature
K. PONGMORAKOT, S. NAMBU, Y. SHIBUTA, T. KOSEKI: Department of Materials Engineering, The University of Tokyo, Japan

11:50 - 12:10

Construction and validation of an inertia friction welding model
F. CORPACE: SNECMA SAFRAN-GROUP, France
C. FRIEBEL: CENAERO, Belgium

12:10 - 12:30

Simulation of inertia friction welding of tempering steel AISI 4140
M. KESSLER, S. SUENGER, C. WUNDERLING, M. F. ZAEH: Institute for Machine Tools and Industrial Management (iwb), Technische Universität München, Germany

12:30 - 13:50

LUNCH

Chairman: Uwe Reisgen

13:50 - 14:15

KEYNOTE

Microstructural evolution during friction stir welding on AA2024 aluminium alloys - application to the prediction of the mechanical properties
V. LEGRAND, S. GASTEBOIS, G. GUILLEMOT, CH. A. GANDIN, L. FOURMENT: MINES ParisTech CEMEF UMR CNRS 7635, France

14:15 - 14:35

Analytical modeling of material flow in friction stir welding
A. TONGNE: Univ Lyon, ENISE, LTDS, UMR 5513 CNRS, France
C. DESRAYAUD: École des Mines de Saint-Etienne, LGF UMR 5307 CNRS, France
M. JAHAZI: École de Technologie Supérieure, Canada
E. FEULVARCH: Univ Lyon, ENISE, LTDS, UMR 5513 CNRS, France

14:35 - 14:55

Semi analytical 1D strain-rate based friction stir welding model for predicting material flow, temperature distribution and slip
M. WERZ, M. SEIDENFUSS: IMWF Universität Stuttgart, Germany

VIII Laser & Electron Beam Welding

Chairman: Uwe Reisgen

14:55 - 15:20

KEYNOTE

Modelling of influence of dynamic processes in the laser, laser-arc and electron-beam welding on the formation of defects in welded joints

G. A. TURICHIN, E. A. VALDAYTSEVA, O. G. KLIMOVA: *Peter the Great Saint-Petersburg Polytechnical University, Institute of Laser and Welding Technologies, Russia*

T. HASSEL, A. E. BENIYASH: *Leibnitz Universität Hannover, Germany*

15:20 - 15:40

Numerical optimization of a laser welding process by use of an additional heat source

F. SIMON: *Junior Professorship of Simulations and Experiments, Bauhaus-Universität Weimar, Germany*

F. NAGEL: *Group of Production Technology, Technische Universität Ilmenau, Germany*

J. HILDEBRAND: *Junior Professorship of Simulations and Experiments, Bauhaus-Universität Weimar, Germany*

J. P. BERGMANN: *Group of Production Technology, Technische Universität Ilmenau, Germany*

15:40 - 16:05

COFFEE BREAK

Chairman: Gleb Turichin

16:05 - 16:25

Numerical simulation of residual stresses and deformations in laser beam melting

T. TÖPPEL, R. KORDASS: *Fraunhofer Institute for Machine Tools and Forming Technology IWU, Germany*

U. BEYER, J. SEIDERER: *simufact engineering gmbh, Germany*

16:25 - 16:45

A fast method for automated calibration of heat sources

C. SCHÖLER: *RWTH Aachen University – Nonlinear Dynamics of Laser Processing, Germany*

M. NIESSEN: *Fraunhofer Institute for Laser Technology, Germany*

U. JANSEN: *RWTH Aachen University – Nonlinear Dynamics of Laser Processing, Germany*

W. SCHULZ: *RWTH Aachen University – Nonlinear Dynamics of Laser Processing and Fraunhofer Institute for Laser Technology, Germany*

IX Special Welding Processes

Chairman: Gleb Turichin

16:45 - 17:10

KEYNOTE

Modelling of stud arc welding process in terms of temperature field, microstructure and residual stress

H. SOLTANZADEH, J. HILDEBRAND: *Junior Professorship of Simulation and Experiments, Bauhaus Universität Weimar, Germany*

17:10 - 17:30

Finite element simulation of high frequency induction tube welding

S. WIPFLER, M. KICIN: Institute of Materials Science and Welding, Graz University of Technology, Austria

R. RAUCH, J. WAGNER: voestalpine Stahl GmbH, Austria

N. ENZINGER: Institute of Materials Science and Welding, Graz University of Technology, Austria

19:00

Wine tasting and Styrian evening at Schloss Seggau

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WEDNESDAY, 30TH SEPTEMBER 2015

IX Special Welding Processes

Chairman: Tobias Loose

09:00 - 09:20

Simple transition resistance model for spot welding simulation of aluminized AHSS

J. KAARS, P. MAYR: Technische Universität Chemnitz, Germany

K. KOPPE: Anhalt University of Applied Sciences, Germany

09:20 - 09:40

Predicting laser bead width and height in laser cladding

G. WOOD, P. MENDEZ: Canadian Centre for Welding and Joining, University of Alberta, Canada

09:40 - 10:00

Finite element and experimental study of shunting in resistance spot welding

M. SEYYEDIAN CHOABI, C. V. NIELSEN, N. BAY: Department of Mechanical Engineering, Technical University Denmark, Denmark

X Modelling Tools & Computer Programs

Chairman: Tobias Loose

10:00 - 10:25

KEYNOTE

Mathematical model of an arc welding weld seam formation on the basis of three dimensional CFD simulations

U. REISGEN, O. MOKROV, O. LISNYI: RWTH Aachen University, ISF – Welding and Joining Institute, Germany

10:25 - 10:50

COFFEE BREAK

Chairman: Patricio Mendez

- 10:50 - 11:10 **Automatic welding path computation and visualization for TIG hot wire cladding for offshore subsea applications**
A. BECIROVIC: Fronius International GmbH, R&D CE Numerical Simulation, Austria
A. BEHMEL: FH Joanneum GmbH, University of Applied Sciences, Institute of Design and Communications, Research & Design Lab Austria
R. BRUNMAIER, A. EDER: Fronius International GmbH, R&D CE Numerical Simulation, Austria
M. JOCHEN: FH Joanneum GmbH, University of Applied Sciences, Institute of Design and Communications, Research & Design Lab Austria
- 11:10 - 11:30 **„Weld+Life“ FEM tool for modelling of manufacture and operation processes in welded structures**
A. S. KURKIN, E. L. MAKAROV: N.E. Bauman Moscow State Technical University, Russia
ALEXANDR S. KISELEV, ALEXEY S. KISELEV: Russian Research Centre "Kurchatov Institute", Russia
A. B. KURKIN, G. P. BATOV: N.E. Bauman Moscow State Technical University, Russia
- 11:30 - 11:50 **Mathematical model of the submerged arc welding process and correspondent software TM-SAWSIM®**
R. V. TSVELEV, A. E. SALIENKO, V. A. SUDNIK, V.A. EROFEEV,
A. V. MASLENNIKOV: PJSC «TYAZHMASH», SJS «Techprom», Cyzran, Russian Federation
- 11:50 - 12:10: **Summary and conclusion**
C. SOMMITSCH

12:10

LUNCH

END OF SEMINAR

Sponsors of the seminar

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ONE STEP AHEAD.

voestalpine Böhler Welding GmbH
voestalpine Stahl GmbH



POSTERS

The posters are accessible during the whole seminar. Please place your poster on Monday morning. Coffee breaks are served in the poster session rooms. All authors are kindly asked and invited to stay with their posters during the breaks.

I Arc Welding, Melt Pool & Solidification

Microstructure generation during CuNi bead on plate: comparison of experimental results and CA prediction

A. CHIOCCA, F. SOULIE, C. BORDREUIL, F. DESCHAUX-BEAUME:

Laboratoire de Mécanique et Génie Civil (LMGC), Université de Montpellier, France

Mathematical model of multi-wire submerged arc welding

A. ULANOV, M. IVANOV: *South Ural State University (National Research University), Russia*

Numerical study of the solidification process in the cast pin tear test

H. WANG, B. ALEXANDROV: *The Ohio State University, USA*

III Microstructure and Mechanical Properties

Microstructure based fatigue failure of dual-phase steel welded joint

G. MOEINI, J. HILDEBRAND: *Bauhaus-Universität Weimar, Germany*

IV Residual Stresses & Distortion

Thermo-mechanical tensioning – an effective buckling mitigation technique

N. R. MANDAL, A. GADAGI, D. PODDAR, S. KUMAR: *Indian Institute of Technology Kharagpur, India*

Analysis of welding deformation on construction of large thin-plate structure by idealized explicit FEM using multigrid method

K. IKSUHIMA, T. HARADA, M. SHIBAHARA: *Osaka Prefecture University, Japan*

Thermo-mechanical analysis of residual stress and distortion of grade P91 steel during GTA welding

M. ZUBAIRUDDIN: *Institute for Plasma Research Gandhinagar, India*

S. K. ALBERT, M. VASUDEVAN, S. MAHADEVAN: *Indira Gandhi Centre for Atomic Research Kalpakkam, India*

V. CHAUDHARI: *Institute for Plasma Research Gandhinagar, India*

V. K. SURI: *Bhabha Atomic Research Centre Mumbai, India*

V Cracking Phenomena

Simulation aided investigation of the hot cracking phenomenon during the welding of high strength steels

*D. SHAKIROV, M. SCHÄNZEL, C. KOBLER, A. ILIN: Robert Bosch GmbH, Germany
M. RETHMEIER: Technische Universität Berlin, Germany*

VII Solid State & Friction Stir Welding

This influence of nano reinforcement on fabrication of Al/Al₂O₃ surface nano composite by friction stir processing

P. NARESH, A. KUMAR: Department of Mechanical Engineering, National Institute of Technology, India

An innovative approach for modelling residual stresses in Ti-6Al-4V linear friction welds

*C. BUHR, A. R. MCANDREW, P. A. COLEGROVE: Cranfield University, UK
L. A. LEE, B. FLIPO, M. RUSSELL: TWI Ltd, UK*

VIII Laser & Electron Beam Welding

Numerical simulation of laser beam shape in laser-hybrid welding for assessment of the propensity for cracks formation

M. IVANOV: South Ural State University (National Research University), Russia

Numerical simulation of laser beam welded Al-Cu joints

*U. HARTEL, A. ILIN, D. SHAKIROV, C. BANTEL: Robert Bosch GmbH, Germany
V. MICHAILOV: BTU Cottbus-Senftenberg, Department of Joining and Welding Technology, Germany*

Simulation of the formation of weld joints during laser welding of dissimilar materials

G. A. TURICHIN, O. G. KLIMOVA, E. A. VALDAYTSEVA, K. D. BABKIN: Peter the Great Saint-Petersburg Polytechnical University, Institute of Laser and Welding Technologies, Russia

Numerical simulation of phase transformations in laser welded butt joints

R. KABOLI, H. LETSCH, P. MAYR: TU Chemnitz - IFMT, Germany

Integrated approach for laser welding characterization and optimization

A. C. DEBAY, J. FEKETE, K. KROENLEIN, S. MILLER, E. PFEIF, J. SOWARDS, B. WILTHAN - MML, M. DOWELL, J. HADLER, D. HUSSEY, J. LEHMAN, N. NEWBURY, B. SIMONDS, P. WILLIAMS - PML: National Institute of Standards and Technology, USA

Simplified modelling approach for distortion prediction of selective laser melting

J. ECENARRO, I. SETIEN, M. SAN SEBASTIAN, A. ECHEVERRIA: IK4-LORTEK, Technological Centre, Spain

IX Special Welding Processes

Numerical analysis of the modes of induction weld deposition of cast iron to steel

A. OSIPOV, YU. BEZGANS: *South Ural State University (National Research University), Russia*

Design and optimization of resistance spot welded railway vehicle structures, demonstrated via IC+ project

I. BORHY: *TÜV Rheinland InterCert Kft., Hungary*

L. BELSŐ: *MÁV-START Zrt., Hungary*

Three-dimensional coupling FE analysis of resistance spot welding

K. IKSUHIMA, T. YANO, R. NATSUME, M. SHIBAHARA: *Osaka Prefecture University, Japan*

X Modelling Tools & Computer Programs

Distributed and integrated characteristics of the near-anode plasma of welding arc in TIG and hybrid (TIG + CO₂ laser) welding

I. KRIVTSUN, V. DEMČENKO, I. KRİKENT: *The E.O. Paton Electric Welding Institute, Ukraine*

U. REISGEN, O. MOKROV, A. ZABIROV: *RWTH Aachen University, ISF – Welding and Joining Institute, Germany*

CEN ISO/TS 18166:2015 - numerical welding simulation – execution and documentation

M. RETHMEIER: *BAM Berlin, Germany*

M. MOCHIZUKI: *Osaka University, Japan*

D. J. DEWEES: *The Babcock & Wilcox Company, USA*

V. ROBIN: *AREVA, France*

C. OHMS: *JRC Petten, The Netherlands*

A. YOUTSOS: *Consultant*

S. D. SMITH: *TWI Ltd., UK*

D. SCHWARK: *DIN, Germany*

Experiences and examples of DIN SPEC 32534 - numerical welding simulation

J. HILDEBRAND: *Bauhaus-Universität Weimar, Germany*

A. BECIROVIC: *Fronius International GmbH, Austria*

D. SCHWARK: *DIN, Germany*

Development of FE pre-processing system for welding deformation analysis of full ship model

M. S. YI, Y. S. HA, S. R. RAJESH, C. M. HYUN: *Material Testing & Production CAE Research Part, Central Research Institute, SAMSUNG Heavy Industries, Co. Ltd., Korea*

Contacts influence on resistance spot weldability of a dissymmetric three-sheets assembly

E. GESLAIN: *Université de Bretagne-Sud, Laboratoire d'Ingénierie des Matériaux de Bretagne and ArcelorMittal Global R&D, France*

PH. ROGEON, T. PIERRE, C. POUVREAU, PH. CHAUVELON: *Université de Bretagne-Sud, Laboratoire d'Ingénierie des Matériaux de Bretagne and ArcelorMittal Global R&D, France*

L. CRETTEUR: *ArcelorMittal Global R&D, France*

P. PAILLARD: *Institut des Matériaux de Nantes, France*

Exhibitors

Fronius Virtual Welding Competition

All participants of the 11th International Seminar Numerical Analysis of Weldability are invited to take part in the Virtual Welding competition.

On the two conference days Monday and Tuesday, 28th and 29th of September, during the coffee breaks, you can execute training and simulation tasks at the Virtual Welding Simulator. Your score will be recorded in a ranking list. The three participants with the highest scores will be awarded during the „Styrian Evening“ (Tuesday, 29th of September).

Fronius International GmbH is looking forward to welcoming you at the booth and wishes all participants in advance good luck for the Virtual Welding competition.

Further Information:

Information regarding Fronius Virtual Welding Simulator will be given during the conference by Fronius International GmbH employees and researchers of FH JOANNEUM Graz.

If you want to get some information in advance please visit the homepage of Fronius International GmbH www.fronius.com.



Recognizing and preventing welding distortions

Welding distortions represent the greatest economic problem for welding process design, next to reduced tensile strength. The simulation software Simufact.welding caters to this problem and allows the user to calculate distortions ahead of time. By implementing complex material models, the resulting local material properties can be calculated and considered during the calculation of distortion on a single user interface. As a result, the number of development loops is greatly reduced.

The Software conveys a broad understanding of the process to the user and aids in the process design by

- Visualization of process influencing values, especially on the temperature distribution, residual stresses and deformations
- Virtual try-out of clamping, welding sequences, clamping times, effects of preheating as well as variation of materials

The new release Simufact.welding 5 also offers an extended application spectrum and covers arc and beam welding in addition to resistance spot welding.



Venue

The 11th International Seminar „Numerical Analysis of Weldability“ will take place at Schloss Seggau, the former bishop residence in the Styrian wine area 40 km south of Graz, Austria.



How to reach Graz

Graz has currently direct scheduled flight connections from Frankfurt, Düsseldorf, Berlin, Stuttgart, Vienna, Palma de Mallorca and Zurich. For more information please visit the website Graz Airport <http://www.flughafen-graz.at/en/home>.

Seminar Organisation

Graz University of Technology, Institute for Materials Science and Welding and IIW Commission IX, Working Group „Mathematical Modelling of Weld Phenomena“

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