

NUMISHEET 2018

The 11th International Conference and Workshop
on Numerical Simulation of 3D Sheet Metal Forming Processes
30 July – 3 August 2018, Tokyo, Japan

PROGRAM AND ABSTRACTS

EDITORS

Toshihiko Kuwabara (Chair)	Tokyo Univ. Agriculture & Technology
Takayuki Hama (Co-Chair)	Kyoto University
Mitsutoshi Kuroda (Co-Chair)	Yamagata University
Susumu Takahashi (Co-Chair)	Nihon University
Akinori Yamanaka (Secretary)	Tokyo Univ. Agriculture & Technology

NISSEI EBLO INC.

5-20-4 SHINBASHI, MINATO-KU, TOKYO 105-0004 JAPAN

Printed in Japan

TABLE OF CONTENTS

Organization of NUMISHEET 2018.....	III
Opening time of registration desk (1st floor).....	V
WiFi access.....	V
Photography and audio/video recording policy	V
Floor Plan	VI
Conference Program.....	1

Abstracts

MS1: Kwansoo Chung Memorial Symposium: Mechanics in Materials Forming.....	13
MS2: Materials and Process Modeling for Hot-Stamping.....	20
MS3: Advanced Material Characterization Using DIC and Inverse Methods.....	22
MS4: Forming of HCP Metals	24
MS5: Advances in Multiscale-Modeling of the Effect of Anisotropy in Forming.....	25
MS6: Sheet Metal Formability: in honor of Prof. Marciniak's 100-year anniversary	28
MS7: Analysis of Sheet Metal Joining and Welding Phenomena.....	31
MS8: Numerical Simulation of Locally Acting Sheet Manufacturing Processes	36
MS9: Material Modelling for Sheet Metal Forming Simulations.....	37
MS10: Springback, Elasticity and Time Effects in Forming	45
MS11: Advanced Simulation and Material Characterization for Micro Metal Forming ..	49
MS12: Friction and Wear in Sheet Metal Forming	50
GS0: Advanced Technology for Sheet Metal Forming	53
GS1: Composites.....	54
GS2: Fracture and Damage	55
GS3: Material Testing	58
GS4: Innovative Forming Methods.....	61
GS5: Process Design and Optimization	64
GS6: Numerical Methods.....	67

ORGANIZATION OF NUMISHEET 2018

CHAIRMAN	Toshihiko Kuwabara (Tokyo Univ. Agriculture & Technology, Japan)
CO-CHAIRMAN	Takayuki Hama (Kyoto University, Japan)
	Mitsutoshi Kuroda (Yamagata University, Japan)
	Susumu Takahashi (Nihon University, Japan)
GENERAL SECRETARY	Akinori Yamanaka (Tokyo Univ. Agriculture & Technology, Japan)

STEERING COMMITTEE

Cardoso, R. (UK)	Hora, P. (Switzerland)	Pourboghraat, F. (USA)
Stoughton, T. B. (USA)	Wagoner, R. H. (USA)	Yang, D. Y. (Korea)
Yoon, Jeong Whan (Australia)		

INTERNATIONAL SCIENTIFIC COMMITTEE

Aretz, H. (Germany)	Balan, T. (France)	Banabic, D. (Romania)
Barlat, F. (Korea)	Cao, J. (USA)	Cazacu, O. (USA)
Cesar de Sa, J. (Portugal)	Chen, J. (China)	Chen, F.-K. (Taiwan)
Chung, W.-J. (Korea)	Coppieters, S. (Belgium)	Dick, R.E. (USA)
Green, D. (Canada)	Habraken, A.M. (Belgium)	Huh, H. (Korea)
Iadicola, M. (USA)	Inal, K. (Canada)	Khan, A.S. (USA)
Kim, Y.S. (Korea)	Kinsey, B. (USA)	Korhonen, A.S. (Finland)
Korkolis, Y.P. (USA)	Kyriakides, S. (USA)	Lee, M.G. (Korea)
Li, X. (China)	Lin, J. (UK)	Manach, P.Y. (France)
Martins, P. (Portugal)	Massoni, E. (France)	Merklein, M. (Germany)
Mohr, D. (Switzerland)	Mulder, H. (Netherlands)	Narasimhan, K. (India)
Ofenheimer, A. (Austria)	Ponthot, J.P. (Belgium)	Reddy, V. (India)
Shi, M. (USA)	Steglich, D. (Germany)	Takizawa, H. (Japan)
Tekkaya, A. E. (Germany)	Thuillier, S. (France)	Tisza, M. (Hungary)
van den Boogaard, A.H. (Netherlands)	Volk, W. (Germany)	Worswick, M. (Canada)
Wu, P. (Canada)	Yoshida, F. (Japan)	Yoshida, K. (Japan)
Zhang, S.-H. (China)		

LOCAL ORGANIZING COMMITTEE

Tsuyoshi Furushima (The University of Tokyo)
 Hiroshi Hamasaki (Hiroshima University)
 Kunio Hayakawa (Shizuoka University)
 Eiji Iizuka (JFE Steel Corporation)
 Takashi Iizuka (Kyoto Institute of Technology)
 Takuya Kobayashi (Mechanical Design & Analysis Corporation)
 Kazutake Komori (Daido University)
 Ninshu Ma (Osaka University)
 Yasushi Maeda (KOBE STEEL, LTD.)
 Takashi Matsuno (Tottori University)
 Takeshi Nishiwaki (Daido University)
 Tetsuo Oya (Keio University)
 Hideo Takizawa (Nippon Institute of Technology)
 Hisashi Takizawa (AutoForm Japan K.K.)
 Hideo Tsutamori (Daido University)
 Takeshi Uemori (Okayama University)
 Hiroshi Utsunomiya (Osaka University)
 Jun Yanagimoto (The University of Tokyo)
 Ming Yang (Tokyo Metropolitan University)
 Shigeru Yonemura (Nippon Steel & Sumitomo Metal Corporation)
 Kengo Yoshida (Shizuoka University)
 Yoshinori Yoshida (Gifu University)
 Nobuki Yukawa (Nagoya University)

BENCHMARK COMMITTEE

BM1 Toshihiko Kuwabara (Chairman, Tokyo Univ. Agriculture & Technology, Japan)
 Tomoyuki Hakoyama (Co-Chairman, Gifu University, Japan)
 Taiki Maeda (Tokyo Univ. Agriculture & Technology, Japan)
 Chiharu Sekiguchi (Tokyo Univ. Agriculture & Technology, Japan)
 BM2 Tomokage Inoue (Chairman, Aisin AW Industries Co., Ltd., Japan)
 Hideo Takizawa (Co-Chairman, Nippon Institute of Technology, Japan)
 Toshihiko Kuwabara (Tokyo Univ. Agriculture & Technology, Japan)
 Shunya Nomura (Tokyo Univ. Agriculture & Technology, Japan)
 BM3 Kengo Yoshida (Chairman, Shizuoka University, Japan)
 Hiroshi Utsunomiya (Co-chair, Osaka University, Japan)
 Keiji Amano (Mitsubishi Aluminum, Japan)
 Hideaki Fukumasu (Mitsubishi Aluminum, Japan)
 Takeshi Handa (Nippon Light Metal Company, Ltd., Japan)
 Takeshi Ichikawa (Kobe Steel, Japan)
 Yuji Kume (Yamagata University, Japan)
 Toshihiko Kuwabara (Tokyo Univ. Agriculture & Technology, Japan)
 Noa Miyake (Tokyo University of Agriculture and Technology, Japan)
 Yoshihiko Moriyama (Nippon Light Metal Company, Ltd., Japan)
 Shinichi Nishida (Gunma University, Japan)
 Osamu Noguchi (UACJ Corporation, Japan)
 Takeo Sakurai (Kobe Steel, Japan)
 Hideo Takizawa (Nippon Institute of Technology, Japan)
 Shinya Tamehiro (Kobe Steel, Japan)
 Tomofumi Tsuji (Shizuoka University, Japan)
 Tsuyoshi Yamamoto (Showa Denko, Japan)
 Akinori Yamanaka (Tokyo Univ. Agriculture & Technology, Japan)

OPENING TIME OF THE REGISTRATION DESK (1ST FLOOR)

July 29, Sunday	17:00 to 19:00
July 30, Monday	7:30 to 21:00
July 31, Tuesday	7:30 to 18:30
Aug 1, Wednesday	7:30 to 17:40
Aug 2, Thursday	7:40 to 19:00

WiFi ACCESS

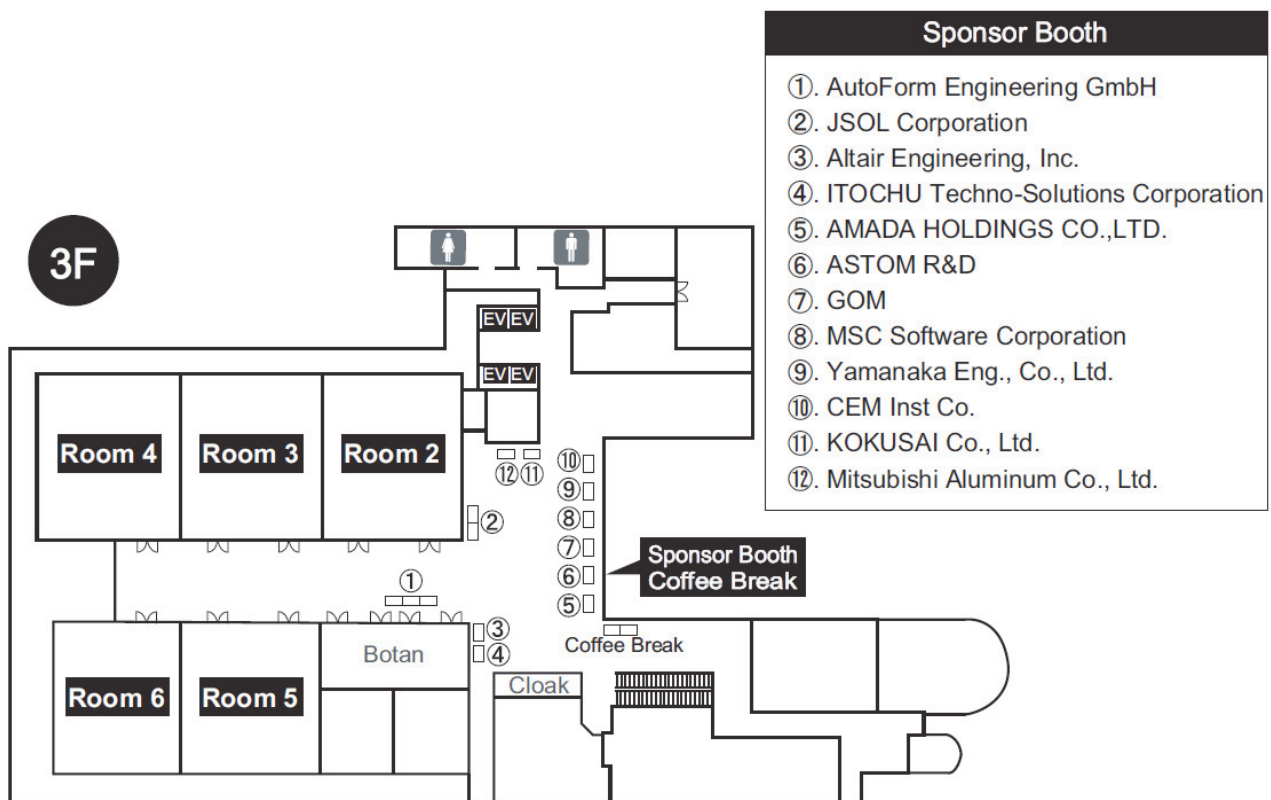
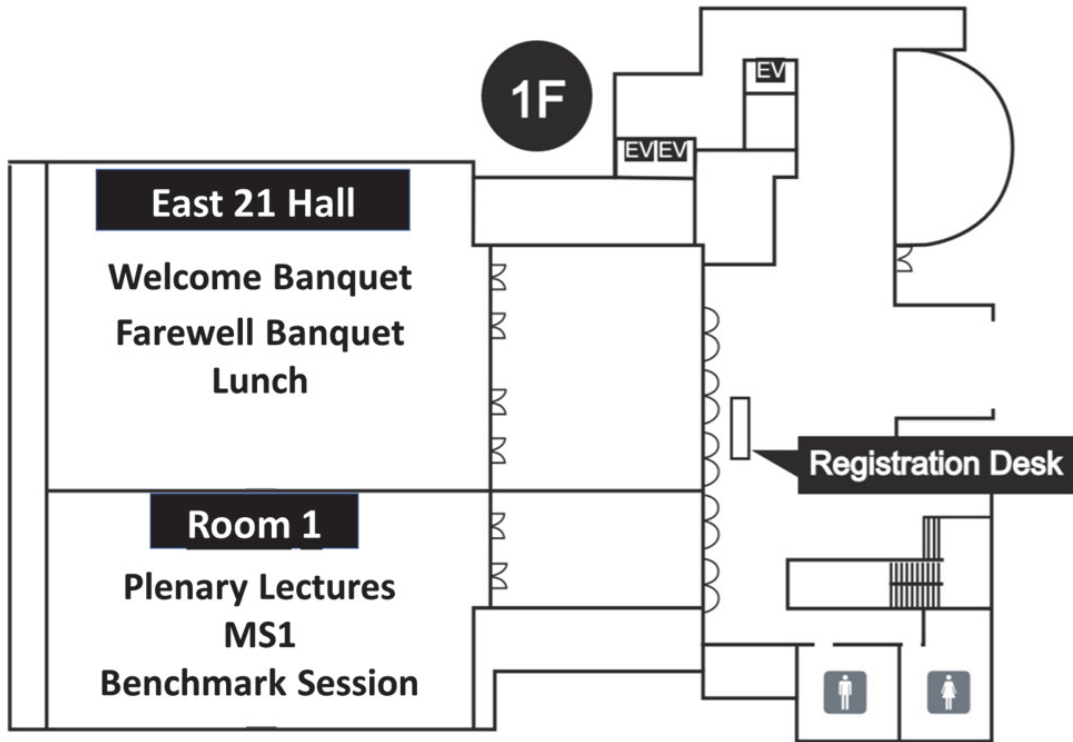
Free wireless internet access will be available throughout the conference venue as follows:

Room	SSID	PW
East 21 Hall (1F)	East21_Hall	east5683h
Robby (2F, 3F)	East21_Public	east5683p
Room 2, 3, 4 (3F)	East21_Eitai	east5683e
Room 5, 6 (3F)	East21_Toyo	east5683t
Botan (3F)	East21_Small_banquet	east5683s

PHOTOGRAPHY AND AUDIO/VIDEO RECORDING POLICY

Any recording of sessions (audio, video, still photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of the individual authors is strictly prohibited. No photos are to be taken of any presenter's slides. Attendees violating this policy may be asked to leave the session or the meeting without refund.

Floor Plan



Conference Program

MON, July 30

Room 1

Industrial plenary lecture: **Bart Carleer, AutoForm Engineering**
Effective Stamping Simulations along the Sheet Metal Process Chain

Academic plenary lecture: **Frédéric Barlat, Pohang University of Science and Technology (POSTECH)**
Advanced Constitutive Modeling and Application in Sheet Forming

Coffee Break

ROOM	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
8:30	9:20	10:10	10:40	11:10	11:30	11:50
Session Title	Kwansoo Chung Memorial Symposium I: Mechanics in Materials Forming	Advanced Material Characterization Using DIC and Inverse Methods I	Forming of HCP Metals I	Advances in Multiscale-Modeling of the Effect of Anisotropy in Forming I	Analysis of Sheet Metal Joining and Welding Phenomena I	Material Modelling for Sheet Metal Forming Simulations I
Chair	M.-G. Lee	S. Coppieeters	T. Hama	F. Barlat	N. Ma	F. Yoshida
10:40	11:10	11:30	11:50	12:10	12:30	12:50
MS1-1: Keynote	MS1-1: Keynote	MS3-1: Keynote	MS4-1: Keynote	MS5-1: Keynote	MS7-1: Keynote	MS9-1: Keynote
An integrated computational materials engineering approach for constitutive modelling of 3rd generation advanced high strength steels	Inverse Yield Locus Identification using a biaxial tension apparatus with link mechanism and displacement fields	Prediction of the torsional response in HCP metals	Yield locus prediction using statistical and RVE-based fast Fourier transform crystal plasticity models and validation for drawing steels	Simulation of fatigue crack growth in weld joint of thin structures using characteristic tensor	A discussion of the associated flow rule based on the FAY model and Nakajima tests	
MS1-2	MS3-2	MS4-2	MS5-2	MS7-2	MS9-2	
Stress update algorithm based on finite difference method and its application to homogenous anisotropic hardening (HAH) model	Development of new experimental test for sheet metals through- thickness behavior characterization	A mechanism-driven plasticity model for deformation by glide and twinning and its application to magnesium alloys	Anisotropic yield criteria	The corrosion behavior of cold spray coating on 2219 aluminium alloy joints prepared by friction stir welding	Effect of the plasticity model on the yield surface evolution after abrupt strain-path changes	
MS1-3	MS3-3	MS4-3	MS5-3	MS7-3	MS9-3	
Effect of ideal flow conditions on springback	Application of the Virtual Fields Method to determine dynamic properties at intermediate strain rates	Crystal plasticity analysis of anisotropic porous magnesium with oriented pores	Study on the influence of orthotropy and tension- compression asymmetry of metal sheets in springback and formability predictions	Study on keyhole and melt flow behaviors of laser welding of aluminum under reduced ambient pressures	A numerical scheme of convex yield function with continuous anisotropic hardening based on non-associated flow rule in FE analysis of sheet metal	
MS1-4			MS5-4	MS7-4	MS9-4	
Mechanical Performance of Resistance Spot Welded Steel Sheets			Plastic deformation of metallic materials during dynamic events	Effect of different coatings on the weldability of Al to steel	On the certification of positive and convex Gotoh's fourth-order yield function	
12:10	13:30	Lunch				

ROOM		Room 1					
		Industrial plenary lecture: Shinichiro Ohsawa, Toyota Motor Corporation					
		Recent Applications and the Future Direction of Stamping Simulation in Toyota Motor Co.					
		Short Coffee Break					
Session Title	Chair	Kwansoo Chung Memorial Symposium II: Mechanics in Materials Forming	Advanced Material Characterization Using DIC and Inverse Methods II	Forming of HCP Metals II	Advances in Multiscale-Modeling of the Effect of Anisotropy in Forming II	Analysis of Sheet Metal Joining and Welding Phenomena II	Material Modelling for Sheet Metal Forming Simulations II
13:30	14:10						
14:10	14:30						
14:30	15:00	J. H. Kim MS1-5: Keynote Thermomechanical Simulations of Blanking Process Operated over a Wide Range of Punch Velocities	M. Rossi MS3-4: Keynote Enhancing the hydraulic bulge-test using full-field DIC data	D. Steglich MS4-4: Keynote Slip activity in a CP-Ti oligocrystal: numerical study and comparison with experiments	A. Van Bael MS5-5: Keynote Prediction of four, six or eight ears in drawn cups of single-crystal aluminum sheets	H. Murakawa MS7-5: Keynote Simulation of welding thermal conduction and thermal stress using hybrid method of accelerated explicit and implicit FEM	T. Uemori MS9-5: Keynote Description of non-linear unloading curve and closure of cyclic stress-strain loop based on Y-U model
15:00	15:20	MS1-6 Determination of forming limits of high strength sound-deadening laminated sheet	MS3-5 Prediction of mechanical properties on large diameter welded pipes through advanced constitutive modelling	MS4-5 Effect of deformation twinning on forming limit analysis of polycrystalline magnesium	MS5-6 On the usage of a grain size sensitive crystal plasticity model in the spectral solver framework	MS7-6 Numerical simulation of thermal supported self-pierce riveting of an ultra high-strength aluminium alloy	MS9-6 Finite element calculations of hole expansion in a thin steel sheet with polynomial yield functions of four and six degrees
15:20	15:40	MS1-7 Modelling transient behavior during stress relaxation	MS3-6 Verification of accuracy of yield functions of sheet steels under shear strains in uniaxial tensile tests in multiple directions	MS4-6 Experimental and numerical study of the inelastic behavior of magnesium alloys during cyclic loading-unloading	MS5-7 Prediction of negative bulge in two point incremental forming of an asymmetric shape part	MS7-7 Numerical simulation and analysis of metal fused coating forming	MS9-7 High accuracy springback simulation by using material model considering the SD effect
15:40	16:00	MS1-8 Numerical study of incremental sheet forming processes			MS5-8 Prediction of tensile deformation behavior of Al-Li alloy 2060-T8 by computational homogenization-based crystal plasticity finite element method	MS7-8 Coupling analysis of molten pool during fused coating process with arc preheating	MS9-8 A plane stress yield function described by multi-segment spline curves and its application
16:00	16:20	MS1-21 An elasto-plastic constitutive model of magnesium alloy sheet at warm forming temperature under strain path changes			MS5-9 A multiscale model to incorporate texture evolution into phenomenological plasticity models	MS7-9 An adaptive-domain-growth method for phase field simulation of dendrite growth in arc preheated fused-coating additive manufacturing	MS9-9 Evaluation of accuracies of phenomenological yield criteria for automotive Al sheets
16:20	16:50						
		Coffee Break					

MON, July 30

Session Title	Kwansoo Chung Memorial Symposium III: Mechanics in Materials Forming	Composites	Advanced Simulation and Material Characterization for Micro Metal Forming	Numerical Methods	Analysis of Sheet Metal Joining and Welding Phenomena III	Material Modelling for Sheet Metal Forming Simulations III	
Chair	W. Lee	T. Oya	M. Yang	O. Cazacu	Z. Li	T. Balan	
16:50	17:20	MS1-9: Keynote Prediction of fracture behavior in hole expansion test using microstructure based dual-scale model	GS1-1: Keynote Deformation behavior analysis based on matrix/yarn sliding friction model of woven fabric green composite under simple tension	MS11-1: Keynote Development of in-situ observation methods of surface roughening behavior by hand-size stretching test for metal foils	GS6-1: Keynote Microstructure-based multiscale approach to obtain mechanical property of duplex stainless steel according to ICME concept	MS9-10: Keynote Development of the user subroutine library "Unified Material Model Driver for Plasticity (UMMDp)" for various anisotropic yield Functions	
17:20	17:40	MS1-10 A Multi-Scale Modelling of 3rd Generation Advanced High Strength Steels to Account for Anisotropic Evolution of Yield Surface and Plastic Potential	GS1-2 Influence of temperature on in-plane and out-of-plane mechanical behaviour of GFRP composite	MS11-2 Crystal plasticity finite-element analysis of surface roughening behaviour in biaxial stretching of steel sheets	MS7-10: Keynote Interaction of laser beam, powder stream and molten pool in laser deposition processing with coaxial nozzle	MS9-11 Development of plug-ins for bridging the variables between advanced finite element codes and 'UMMDp'	
17:40	18:00	MS1-11 Formability predictions and measurement of 316L stainless steel using self-consistent crystal plasticity	GS1-3 Numerical modeling of thermoplastic resin behavior for thermoforming of laminates composed of non-crimp fabrics	MS11-3 Deformation-induced surface roughening of an Al-Mg alloy	MS7-12 Welding distortion prediction and process optimization of turbine component by electron beam welding	MS9-12 Implementation of anisotropic yield functions into the subroutine library "UMMDp"	
18:00	18:20	MS1-12 FE implementation of HAH model using FDM-based stress update algorithm for springback prediction of AHSS sheets	MS11-4 Design of a reverse deep drawing experiment enhancing strain path changes	GS6-3 Automatic calibration of 3D anisotropic yield criteria using a parallel evolutionary algorithm	MS7-13 Numerical simulation and experimental validation of self-piercing riveting (SPR) of 6XXX aluminum alloys for automotive applications	MS9-13 Practical examples of sheet metal forming simulations using the subroutine library 'UMMDp'	
18:20	18:40	MS1-22 Crystal plasticity based constitutive modeling of ZEK100 magnesium alloy combined with in-situ HEXRD experiments		GS6-4 A GPU based explicit solid-shell finite element solver			
19:00	21:00	Welcome Banquet (EAST 21 Hall)					

Tue, July 31

Room 1

Industrial plenary lecture: **Hiroshi Fukiharu, JSOL CORPORATION**

The Current Status and Development of Practical Sheet Metal Forming Simulation

Academic plenary lecture: **Viggo Tvergaard, Technical University of Denmark (DTU)**

Plastic Flow Localization and Ductile Fracture

Coffee Break

ROOM	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
8:30	9:20	Industrial plenary lecture: Hiroshi Fukiharu, JSOL CORPORATION				
9:20	10:10	Academic plenary lecture: Viggo Tvergaard, Technical University of Denmark (DTU)				
10:10	10:40	Coffee Break				
ROOM	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
Session Title	Kwansoo Chung Memorial Symposium IV: Mechanics in Materials Forming	Springback, Elasticity and Time Effects in Forming I	Fracture and Damage I	Process Design and Optimization I	Analysis of Sheet Metal Joining and Welding Phenomena IV	Material Modelling for Sheet Metal Forming Simulations IV
Chair	J.-W. Yoon	A.H. van den Boogaard	S. Takahashi	P. Hora	Liqun Li	H. Takizawa
10:40	11:10	MS1-13: Keynote A crystal plasticity study on the deformation of an AZ31 alloy sheet under elevated temperature	MS10-1: Keynote Spring-back prediction based on a rate-dependent isotropic-kinematic hardening model and its experimental verification	GS2-1: Keynote Extension of the DF2015 criterion into an anisotropic ductile fracture criterion	GS5-1: Keynote Drawbead uplift force analytical model for deep drawing operations	MS9-14: Keynote The application of crystal plasticity material files in stamping simulations
11:10	11:30	MS1-14 Failure prediction of AZ31B Mg sheet at room temperature considering material anisotropy and differential work hardening	MS10-2 The effect of loading modes on springback behaviour of austenitic stainless steels sheets in three points bending	GS2-2 Identification method of an advanced constitutive law for nickel-based alloy Haynes 230 used in solar receivers	MS7-15 Numerical analysis on stress evolution during GTA-additive manufacturing of thin-walled aluminum alloys	MS9-15 Prediction of mechanical response and microstructure evolution for 5000-Series Aluminum Alloy coupling visco-plastic self-consistent approach with finite element method
11:30	11:50	MS1-15 Effect of distortional hardening behaviour on material response of pure titanium sheets during hydraulic bulge test	MS10-3 Investigation on strain dependent elastic behavior for accurate springback analysis	GS2-3 A new strain-based method to determine GTN parameters for thin stainless steel foil	MS7-16 Modeling of process parameters and sectional shape of sample in single-layer angle-pass Sn63Pb37 fused coating additive manufacturing	MS9-16 Experimental and numerical investigation of ironing in deep drawn parts
11:50	12:10	MS1-16 Constitutive modeling and FE implementation for anisotropic hardening under proportional loading conditions	MS10-4 Kinematic hardening performance of 5052 aluminum alloy subjected to cyclic compression-tension	GS2-4 On the effect of stress state on the failure limits of hole-flanged parts formed by SPIF	MS7-17 Research on remelting phenomena and metal joining of fused-coating additive manufacturing	MS9-17 The evolution of mechanical properties of AISI 301 as a result of phase reversion heat treatment, experiment and modeling
12:10	13:30	Lunch				

Tue, July 31

Room 1

Industrial plenary lecture: **Shunji Hiwatashi, Nippon Steel & Sumitomo Metal Corporation**
Simulation-Aided Application of Advanced Sheet Steels to Automotive Parts

Short Coffee Break

ROOM	Session Title	Chair	Kwansoo Chung Memorial Symposium V: Mechanics in Materials Forming	Springback, Elasticity and Time Effects in Forming II	Fracture and Damage II	Process Design and Optimization II	Sheet Metal Formability: in honor of Prof. Marciniak's 100-year anniversary I	Material Modelling for Sheet Metal Forming Simulations V
13:30	14:10							
14:10	14:30							
14:30	15:00	D. Kim	MS1-17: Keynote Ductile fracture of AA6111 alloy including the effect of bake-hardening	MS10-5: Keynote A constitutive law based on the self-consistent homogenization theory for improved springback simulation of a dual-phase steel	GS2-5: Keynote Failure prediction in incremental sheet forming based on Lemaitre damage model	GS5-5: Keynote Numerical investigation of a new sheet metal shear cutting tool design to increase the part quality by superposed compression stress	MS6-1: Keynote Experimental and numerical investigations on determination of strain localization in sheet forming	R. Cardoso MS9-18: Keynote Work-hardening behaviour of sheet steels in large strain regions and its simple approximation
15:00	15:20		MS1-18 Influence of paint baking process on fracture initiation of an Al-Mg-Si alloy sheet	MS10-6 Effect of pre-strain on creep behavior of titanium alloy sheets and springback simulation	GS2-6 Damage mechanics modelling of material separation in self-pierce riveting (SPR) process	GS5-6 Energy efficient roll forming processes through numerical simulations	MS6-2 The performance of Marciniak-Kuczynski approach on prediction of plastic instability of metals subjected to complex loadings	MS9-19 Biaxial deformation and martensitic transformation behavior observation on type 304 stainless steel by biaxial bulge test
15:20	15:40		MS1-19 Constitutive modelling of carbon fiber-reinforced shape memory polymer composites	MS10-7 Crystal-plasticity finite-element simulation of time-dependent springback in a commercially-pure titanium sheet	GS2-7 Measurement of local necking in tensile test of mild steel sheet for forming numerical simulation	GS5-7 Numerical study on the thickness homogenization in hole-flanging by SPIF	MS6-3 Phenomenological model for prediction of localized necking in multi-step sheet metal forming processes	MS9-20 Finite element analysis of AHS steel under dynamic loading using a micromechanical modelling
15:40	16:00		MS1-20 Effect of deformation induced nonlinear and anisotropic elastoplasticity on sheet forming simulations	MS10-8 Investigation on stress relaxation behavior of high-strength steel sheets based on elasto-viscoplasticity	GS2-8 Numerical investigations on a framework for fracture prediction in metal forming with a material model based on stress-rate dependence and non-associated flow rule	GS5-8 Analyses of press formability of CFRP sheet considering the fiber kinking and the ductile behavior of resin	MS6-4 Evolution of plastic anisotropy and strain rate sensitivity	MS9-21 Parameter calibration for a shear modified GTN damage model and its application to forming limited prediction
16:00	16:20						MS6-5 Multi-stage two point incremental sheet forming	MS9-22 Simulation of electrohydraulic free forming of DP600 sheets using a modified Rousseller damage model
16:20	16:50							

Coffee Break

ROOM	Room 2	Room 3	Room 4	Room 5	Room 6
Session Title	Springback, Elasticity and Time Effects in Forming III	Fracture and Damage III	Process Design and Optimization III	Sheet Metal Formability: in honor of Prof. Marciniak's 100-year anniversary II	Material Modelling for Sheet Metal Forming Simulations VI
Chair	H. Huh	K. Narasimhan	K. Hayakawa	D. Banabic	K. Oide
16:50	17:20	17:20	17:40	18:00	18:20
	MS10-9: Keynote	GS2-9: Keynote	GS5-9: Keynote	MS6-6: Keynote	MS9-23: Keynote
	Numerical simulation of forming and springback of ultra-thin copper alloy sheets	Material characterization and fracture prediction with advanced constitutive model and polar EPS fracture diagram for AA 3104-H19	Metamodel-based methods to verify the feasibility of a process control in deep drawing	A microstructure based modelling of high strength steel sheet under stretch-bending	Generalization of Hill's yield function for planar plastic anisotropy
	MS10-10	GS2-10	GS5-10	MS6-7	MS9-24
	Analysis of anisotropic effects in single point incremental forming	Development of the crack-line-update method for two-dimensional piercing simulations	Investigation on stretch forming process of thick double-curved aluminium alloy component	Prediction of the formability limit using damage mechanics	Earing prediction of AA 2008-T4 with anisotropic Drucker yield function based on the second and third stress invariants
	MS10-11	GS2-11	GS5-11	MS6-8	MS9-25
	Accurate prediction of springback after coining operation	Finite element analysis of blanking operation of magnesium alloy (AZ31) sheet using ductile fracture criteria and its experimental verification at various temperatures	Stamping parameters optimization of a AA5754 A-pillar by response surface methodology	Influence of alloy chemistry on the texture evolution and plastic anisotropy of ultra-fine grained aluminum alloys	Influence of hardening functions on earing prediction in cup drawing of AA3104 aluminum alloy sheet
	18:00	18:20	18:20	18:20	18:20
				MS6-9	MS9-26
				Toward development of optimum specimen designs and modeling of in-plane uniaxial compression testing of aluminum alloy 2024 and AISI 1008 steel sheet material	An alternative procedure to identify stress-strain relation for DP980 sheet over a large strain range

Wed, Aug 1

Room 1

Academic plenary lecture: **Peidong Wu, McMaster University**

Crystal Plasticity Modelling of Large Strain Behaviour of HCP Materials

Academic plenary lecture: **Yasumasa Chino, National Institute of Advanced Industrial Science and Technology**

Enhanced Room Temperature Formability of Magnesium Alloy Sheets by Suppression of Basal Texture Formation

Coffee Break

ROOM	Room 2	Room 3	Room 4	Room 5
8:30 9:20	Springback, Elasticity and Time Effects in Forming IV	Material Testing I	Numerical Simulation of Locally Acting Sheet Manufacturing Processes	Advanced Technology for Sheet Metal Forming
9:20 10:10	S. Thuillier	M. Kuroda	A. M. Habraken	K. Manabe
10:10 10:40	MS10-12: Keynote Effect of warm forming on formability and springback of aluminum alloy brazing sheet	GS3-1: Keynote Prediction of flow stress curve of metallic foam using compressible constitutive equation	MS8-1: Keynote Experimental and numerical analysis of the flanging process by SPIF	GS0-1: Keynote Recent developments in multi-disciplinary applications of stamping simulation
10:40 11:10	MS10-13 Guideline to optimize the convergence behaviour of the geometrical springback compensation	GS3-2 Cruciform specimen design for large plastic strain during biaxial tensile testing	MS8-2 Experiments and simulation of shape and thickness evolution in multi-pass tube spinning	GS0-2 Validation of the stoning method by numerical and experimental investigation of outer panels with and without surface deflections
11:10 11:30	MS10-14 Evaluation of all springback aspects through a success story on Ford Cargo Truck Door Opening Part	GS3-3 Improvement of the drawing ratio of the anisotropic material behaviour under near plane strain conditions for DP600 characterized in elliptic hydraulic bulge test	MS8-3 Study on spinning process of thin-walled curvilinear generatrix parts based on variable thickness blanks	GS0-3 Cellular automaton calculation for dynamic recrystallization
11:30 11:50		GS3-4 Examination of evaluation method of uniaxial compressive property of cold-formed duplex embossed sheet metal by FEM analysis	MS8-4 Method to increase denting stiffness of car body skin panels	
11:50 12:10				
12:10 13:20	Lunch			

ROOM		Room 1
13:30	14:10	Industrial plenary lecture: Eiji Iizuka, JFE Steel Corporation
Forming Analysis Technologies for Application of High Strength Steels to Automotive Parts		
14:10	14:30	Short Coffee Break
14:30	14:40	Benchmark: Introduction
14:40	15:30	Benchmark 1 Hole Expansion of High Strength Steel Sheet
15:30	16:20	Benchmark 2 Cup Drawing of Anisotropic Thick Steel Sheet
16:20	17:10	Benchmark 3 Prediction of Yield Locus and R-value Distribution for 5000-Series Aluminum Alloy Sheet Using Crystal Plasticity Analysis

Thu, Aug 2

ROOM	Room 2	Room 3	Room 4	Room 5
Session Title	Materials and Process Modeling for Hot-Stamping I	Material Testing II	Friction and Wear in Sheet Metal Forming I	Innovative Forming Methods I
Chair	X. Li	T. Iizuka	T. Chezan	S.-h. Zhang
8:40	9:10	9:10	9:10	9:10
	MS2-1: Keynote	GS3-5: Keynote	MS12-1: Keynote	GS4-1: Keynote
	Biaxial deformation on AA5182-O aluminum alloy sheet at warm temperature	Ductile failure under combined tension and shear	Friction in sheet metal forming: forming simulations of dies in try-out	Double sided incremental forming: capabilities and challenges
9:10	9:30	9:10	9:30	9:30
	MS2-2	GS3-6	MS12-2	GS4-2
	Development of a material model for AA7075 aluminium hot stamping	Influence of zinc coating on anisotropic mechanical properties of hot dip galvanized steel sheet DP600	Data-driven modelling in the era of Industry 4.0: A case study of friction modelling in sheet metal forming simulations	Electromagnetically assisted sheet metal stamping with non-disposable foil coils
9:30	9:50	9:30	9:50	9:30
	MS2-3	GS3-7	MS12-3	GS4-3
	Unified constitutive model of aluminum alloy 2219 at elevated temperature	Characterization of mechanical properties and formability of a superplastic Al-Mg alloy	Temperature dependent micromechanics-based friction model for cold stamping processes	Numerical and experimental investigation on tube hot gas forming process for UHSS
9:50	10:10	9:50	10:10	9:50
		GS3-8	MS12-4	GS4-4
		Characterization of high strain rate material behaviour for high-speed forming and cutting applications	Temperature analysis during the drawing of an aluminum cylindrical cup	Characterization of ultra-fine grained AA 6061 alloy sheets processed through two different severe plastic deformation techniques
10:10	10:40	Coffee Break		

ROOM	Room 2	Room 3	Room 4	Room 5
Session Title	Materials and Process Modeling for Hot-Stamping II	Material Testing III	Friction and Wear in Sheet Metal Forming II	Innovative Forming Methods II
Chair	H. Hamasaki	H. Utsunomiya	J. Hol	V. Reddy
10:40 11:10	MS2-4: Keynote Suitability of material models in finite element simulation of stress relaxation for titanium sheets	GS3-9: Keynote Evaluation of tension-compression asymmetry of a low-carbon steel sheet using a modified classical compression test method	MS12-5: Keynote Strategies for increasing the accuracy of sheet metal forming finite element models	GS4-5: Keynote Experimental investigation of novel impact hydroforming technology on sheet metal formability
11:10 11:30	MS2-5 Properties prediction modelling for hot stamping products and its validation in a U-cap part	GS3-10 Sheet thickness reduction influence on fracture strain determination	MS12-6 Study of frictional contact conditions in the hole expansion test	GS4-6 Case studies on chain-die forming for AHSS
11:30 11:50	MS2-6 Analysis of flow stress behaviour of inconel alloys at elevated temperatures using constitutive model	GS3-11 Material testing in support of the development and calibration of material models for forming simulations	MS12-7 Evaluation of surface asperity based contact friction models under different conditions	GS4-7 Comparison of thickness variation in multistage deep drawing of a stator motor housing by experimental and simulation methods
11:50 12:10	MS2-7 Deep drawing of press hardening steels		MS12-8 Modeling of contact zones in air bending of sheet metals	GS4-8 Developing a progressive draw with ironing tool for manufacturing a solenoid casing
12:10 13:20	Lunch			
	Excursion			
13:30 17:00	T-1 TOKYO SKYTREE® (40) T-2 ① River Cruise & Hama-rikyu Gardens (80) (English guide) T-2 ② River Cruise & Hama-rikyu Gardens (40) (Japanese guide) T-3 Meiji Shrine & Harajuku (80) T-4 Edo-Tokyo Museum and Asakusa(40)			
18:00 20:30	Farewell Banquet (EAST 21 Hall)			

Fri, Aug 3

TBD

ROOM	10:00	10:15	Closing Remark
			Technical Tour
	10:30	18:30	<ol style="list-style-type: none"> 1. JAXA (Chofu Aero Space Center) 2. Nissan Yokohama Plant 3. JFE Chiba Steel Plant 4. Amada Press Machine Exhibition Center