



***Material Property Data
for More Effective
Numerical Analysis***

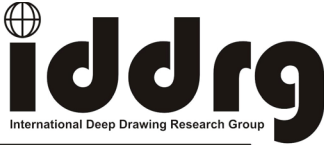


June 1-3, 2009

Colorado School of Mines

Golden, Colorado, USA

2009 Conference Program



2009 Conference

Sunday May 31, 2009

CSM Geological Museum

6–8 pm **Registration and Opening Reception**

Monday June 1, 2009

7:45 am **Registration - Green Center Lobby**

Session: Opening – Petroleum Hall – Chair: Chester Van Tyne

8:30 **Welcoming** by M.W. Scoggins, President of CSM

8:35 **Opening of Conference**, Alain Col, President of IDDRG

Monday Morning Session

Session: Monday Morning 1 - Petroleum Hall - Chair: David Matlock

- 8:45 **Material characterization from R and n, through the present, and into the future – Remarks of a past IDDRG president** Bernard Levy^{1,2}, ¹B.S. Levy Consultants, Chicago, IL, United States, ²Advanced Steel Processing and Products Research Center, Golden, CO, United States (page 1)
- 9:10 **Residual stresses in Numisheet 2005 benchmark 3 panels** Thomas Gnäupel-Herold^{1,2}, Timothy Focke³, Mark Iadicola³, ¹NIST Center for Neutron Research, Gaithersburg MD, United States, ²University of Maryland, College Park MD, United States, ³NIST Metallurgy Division, Gaithersburg MD, United States (page 7)
- 9:35 **Thermoactive process modeling of deep drawing with austenitic stainless steels** Jürg Krauer¹, Pavel Hora¹, ¹IVP, ETH Zürich, Zürich, Switzerland (page 17)
- 10:00 Coffee Break - Green Center Lobby

Session: Monday Morning 2 - Petroleum Hall - Chair Robert Wagoner

- 10:30 **High strain rate constitutive relations and ductility parameters via electromagnetic launch and velocimetry** Jason Johnson¹, Gregg Fenton², Geoff Taber¹, Anupam Vivek¹, Glenn Daehn¹, ¹Ohio State University, Columbus, OH, United States, ²Applied Research Assoc., Albuquerque, NM, United States (page 29)
- 10:55 **Simulation of roller hemming process with Abaqus explicit** Amaia Arroyo¹, Iñaki Perez¹, Maria Angeles Gutierrez¹, Jesus Bahillo², Hermann Toja², ¹Labein-Tecnalia, Derio (Bizkaia), Spain, ²Ingemat, S.A., Zamudio (Bizkaia), Spain (page 41)
- 11:20 **Shear failures in bending of advanced high strength steels** A.W. Hudgins¹, D.K. Matlock¹, J.G. Spear¹, ¹Colorado School of Mines, Golden, CO, United States (page 53)
- 11:45 **A new approach to predicting edge splits - The combined FLD/HEC diagram** Calum McEwan¹, Richard Underhill², Nico Langerak¹, Gerben Botman¹, M. de Bruine¹, ¹Corus Research Development & Technology, IJmuiden, Netherlands, ²Corus Strip Products UK, Newport, United Kingdom (page 65)
- 12:10 **Auto/Steel Partnership, Special Sponsor of IDDRG2009**, David Matlock, Director of ASPPRC
- 12:20 Lunch - Friedhoff Hall
- 1:20 View Posters and Exhibits - Green Center Lobby

Monday Afternoon Sessions

Session: Materials Characterization and Numerical Analysis 1 **Petroleum Hall - Chair James Gerdeen**

- 2:00 **Accurate constitutive equation for dual-phase sheet steels**
Ji Hyun Sung¹, Ji Hoon Kim¹, R.H. Wagoner¹,
¹Ohio State University, Columbus, OH, United States (page 165)
- 2:25 **Comparison of earing using two anisotropic models: Quadratic non-associated and non-quadratic associated**
Aboozar Taherizadeh¹, Daniel Green¹, Abbas Ghaei¹,
¹University of Windsor, Windsor, ON, Canada (page 177)
- 2:50 **On isotropic yield criteria** William Hosford¹,
¹University of Michigan, Ann Arbor Michigan, United States
(page 189)
- 3:15 Coffee Break - Green Center Lobby

Session: Materials Characterization and Numerical Analysis 2 **Petroleum Hall - Chair: Fuh-Kuo Chen**

- 3:45 **Work hardening prediction using a dislocation based model for aluminium automotive alloys**
Salima Bouvier¹, Tales Carvalho Resende^{1,2}, Simon-Serge Sablin²,
¹LPMTM-CNRS UPR 9001, Villetaneuse, France, ²Renault,
Guyancourt, France (page 197)
- 4:10 **Material data for advanced yield surface and hardening models in AutoForm** Matthias Sester¹, Andriy Krasovskyy¹,
Waldemar Kubli¹, ¹AutoForm Engineering GmbH, Zurich, Switzerland
(page 207)
- 4:35 **Characterization and modelling of the influence of the strain rate on the mechanical behaviour of high-strength steels and stainless steels** L. Samek¹, D. Bjorkstrom², A. Melander², E. Arenholz¹, L. Vellido³, ¹voestalpine Stahl, Linz, Austria, ²Swerea-Kimab, Stockholm, Sweden, ³Labein, Derio, Spain (page 219)
- 5:00 **Application of web enabled expert system for bending operation**
Rahul Hingole¹, Vilas Nandedkar¹,
¹Siddhant COE, Pune, MS, India (page 231)

6-8 pm Cocktail Party – Golden Hotel

Monday Afternoon Sessions

Session: Failure Limits 1 – Metals Hall - Chair: Hiaschi Hyashi

- 2:00 **Hole expansion properties of quench & partition steels**
Emmanuel De Moor¹, Cecilia Fojer², Jan Penning³, John G. Speer¹,
¹Advanced Steel Processing and Products Research Center,
Colorado School of Mines, Golden, CO, United States,
²ArcelorMittal Research Industry Gent, OCAS NV, ArcelorMittal Group,
Zelzate, Belgium, ³Department of Materials Science & Engineering,
Gent University, Zwijnaarde, Belgium (page 413)
- 2:25 **Forming limits of stretch-bent steel sheets**
Daniela Kitting¹, Aldo Ofenheimer¹, Heinrich Pauli², Edwin T. Till², ¹Virtual
Vehicle, Graz, Austria, ²voestalpine Stahl GmbH, Linz, Austria (page 425)
- 2:50 **Numerical methods for a robust user-independent evaluation of
Nakajima tests for the FLC determination**
Pavel Hora¹, Beat Eberle¹, Wolfram Volk², ¹ETH Zurich, Zurich,
Switzerland, ²BMW Group, Munich, Germany (page 437)
- 3:15 Coffee Break - Green Center Lobby

Session: Failure Limits 2 – Metals Hall - Chair: Matt Sklad

- 3:45 **Failure analysis of advanced high strength steels (AHSS)
during draw bending**
Hyunok Kim¹, Alexander Bandar², Yu-Ping Yang¹,
Ji Hyun Sung³, Robert Wagoner³, ¹Edison Welding Institute (EWI),
Columbus, OH, United States, ²Scientific Forming Technologies
Corporation (SFTC), Columbus, OH, United States,
³The Ohio State University, Columbus, OH, United States (page 449)
- 4:10 **Investigation on advanced forming limit prediction techniques for
high strength steels**
Christian Held¹, Ralf Schleich¹, Manfred Sindel³, Mathias Liewald²,
¹Hochschullnstitute Neckarsulm, Neckarsulm, Germany, ²Institut für
Umformtechnik, Universitaet Stuttgart, Stuttgart, Germany, ³AUDI AG,
Neckarsulm, Germany (page 461)
- 4:35 **Effect of failure criteria on the forming limits predictions of forming
grade aluminum sheets**
Nikhil Ramakrishnan¹, Vivek Srivastava², K Narasimhan¹,
¹IIT Bombay, Mumbai, Maharashtra, India, ²Aditya Birla Science and
Technology Company (ABSTC), Mumbai, Maharashtra, India (page 471)
- 6-8 pm Cocktail Party – Golden Hotel

Monday Afternoon Sessions

Session: Sheet Metal Processes **Green Center Room 265 - Chair: Boel Wadman**

- 2:00 **Investigation of the high strength steel Al-Si coating in hot stamping operations**
Andrea Ghiotti¹, Francesca Borsetto¹, Stefania Bruschi²,
¹*DIMEG - University of Padova, Padova, Italy*, ²*DIMES - University of Trento, Trento, Italy* (page 649)
- 2:25 **Modeling and determination of flow curves for the simulation of hot forming**
Bernd Hochholdinger¹, Hannes Grass², Arnulf Lipp², Pavel Hora¹,
¹*IVP, ETH Zurich, Zurich, Switzerland*, ²*BMW Group, Munich, Germany* (page 659)
- 2:50 **Production of weight optimized structural body parts by using press hardenable steel**
Franz-Josef Lenze¹, Sascha Sikora¹, Janko Banik¹, M. Weber²
¹*ThyssenKrupp Steel, Dortmund, Germany*, ²*ThyssenKrupp Steel USA, Calvert, AL, United States* (page 671)
- 3:15 Coffee Break - Green Center Lobby

Session: Sheet Metal Processes **Green Center Room 265 - Chair: Tylan Altan**

- 3:45 **Evaluation of coefficients of friction for hot stamping by newly developed tribosimulator**
Akira Yanagida¹, Akira Azushima¹,
¹*Yokohama National University, Yokohama, Japan* (page 683)
- 4:10 **Wear mechanisms in forming of HSS and AHSS**
Matthias Weiss¹, Michael P. Pereira¹, B.F. Rolfe¹, Tim Hilditch¹,
¹*Deakin University, VIC, Australia* (page 691)
- 4:25 **Estimation of tool performance during cold forming of AHSS**
Ricardo Hernandez¹, Ingrid Picas¹, Albert Llobet¹, D. Casella¹,
¹*CTM Technological Center, Manresa, Barcelona, Spain* (page 703)
- 5:00 **Mechanics of forming thin ring plates**
Ernest Nazaryan¹, Najmeddin Arab¹, Mileta Arakelyan¹, Armen Markosyan¹,
¹*Yerevan State University, Yerevan, Armenia* (page 715)
- 6-8 pm Cocktail Party – Golden Hotel

Tuesday June 2, 2009

Session: Tuesday Morning 1 - Petroleum Hall - Chair Nico Langerak

- 8:30 **Relationship between the tribological behaviour of galvanized steel sheets and the evolution of their surface roughness during friction**
Gilles Payen^{1,2}, Eric Felder¹, Monique Repoux¹, Jean-Michel Mataigne²,
¹Mines ParisTech, CEMEF - Centre de Mise en Forme des Matériaux, CNRS UMR 7635, Sophia Antipolis, France, ²ArcelorMittal Maizières, Maizières-lès-Metz, France (page 73)
- 8:55 **Method for local measurement of stress and strain in a formed part under load**
Mark Iadicola¹, Tim Foecke¹, L. Ma¹
¹NIST, Gaithersburg, MD, United States (page 85)
- 9:20 **Implementation of mixed kinematic–isotropic hardening into MK analysis to calculate forming limit diagrams**
Morteza Nurcheshmeh¹, Daniel Green¹,
¹University of Windsor, Windsor, ON, Canada (page 97)
- 9:45 **Analysis of the decrease of the apparent Young’s modulus of advanced high strength steels and its effect in bending simulations**
Raul Cobo¹, Marc Pla¹, Ricardo Hernández¹, Jose Antonio Benito^{1,2},
¹CTM Technology centre, Manresa, Spain, ²EUETIB -UPC, Barcelona, Spain (page 109)
- 10:10 Coffee Break - Green Center Lobby

Session: Tuesday Morning 2 – Petroleum Hall - Chair: Alain Col

- 10:40 **Non-proportional hardening of dual phase steels and its constitutive representation**
L. Sun¹, J.H. Kim¹, R.H. Wagoner¹,
¹*Ohio State University, Columbus, OH, United States (page 119)*
- 11:05 **Localized die temperature control for tailored properties in hot forming of boron steels – numerical study**
Ryan George¹, Alexander Bardelcik¹, Michael Worswick¹,
¹*University of Waterloo, Waterloo, ON, Canada (page 131)*
- 11:30 **Continuous damage mechanics: Formability assessment in sheet metal forming**
Pedro Teixeira¹, Francisco Pires², Abel D. Santos^{1,2}, José César de Sá², Augusto Barata da Rocha^{1,2},
¹*INEGI-Institute of Mechanical Engineering and Industrial Management, Porto, Portugal, ²FEUP-Faculty of Engineering, University of Porto, Porto, Portugal (page 141)*
- 11:55 **Effects of anisotropic yield functions on the accuracy of forming simulations of hole expansion**
Eiji Iizuka¹, Kazuma Hashimoto², Toshihiko Kuwabara², Akinobu Ishiwatari¹, Toru Inazumi¹,
¹*JFE Steel Corporation, Chuo-ku, Chiba, Japan, ²Tokyo University of Agriculture and Technology, Koganei-shi, Tokyo, Japan (page 153)*
- 12:20 Lunch - *Friedhoff Hall*
- 1:20 View Posters and Exhibits - *Green Center Lobby*

Session: Materials Characterization and Numerical Analysis 3
Petroleum Hall - Chair: Pavel Hora

- 1:50 **Investigation on surface deflection of outer panels applied to high strength steels**
Kentarō Sato¹, Michael Trompeter², Akihide Yoshitake¹, T. Inazumi¹,
A. Erman Tekkaya², ¹*JFE Steel Corporation, Hiroshima, Japan*,
²*TU Dortmund University, Dortmund, Germany (page 239)*
- 2:15 **An investigation of surface distortion in flange dies**
Ying Huang¹, Hui-ping Wang², Numpon Mahayotsanun¹, Wonoh Lee¹,
Siguang Xu², Chuan-tao Wang², Ming Shi³, Jian Cao¹, ¹*Northwestern*
University, Evanston, IL, United States, ²*General Motors, Warren, MI,*
United States, ³*United States Steel Corp, Troy, MI, United States*
(page 251)
- 2:35 **On a methodology for the development of intermediate forms for stampings processed in multi-stages**
Victor Apanovitch¹, Stefan Huhn¹, ¹*Forming Technologies Inc., Oakville,*
ON, Canada (page 263)
- 2:55 **Die design for stamping automotive structural parts with advanced high strength steel sheets**
Fuh-Kuo Chen¹, Shi-Wei Liu¹, Tsu-Shin Chiang¹, Kan-Ming Hsu²,
Yen-Ru Pan³,
¹*Department of Mechanical Engineering, National Taiwan University,*
Taipei, Taiwan, ²*Steel & Aluminum R&D Dept., China Steel Corporation,*
Kaohsiung, Taiwan, ³*Parts Development Division, China Motor*
Corporation, Taoyuan, Taiwan (page 273)
- 3:15 **Constitutive relations for plastic deformation in AA 5754 sheet**
Lin Hu¹, Stephen Banovic², Timothy Foecke², Mark Iadicola²,
Anthony Rollett¹, ¹*Carnegie Mellon University, Pittsburgh, PA, United*
States, ²*NIST, Gaithersburg, MD, United States (page 285)*
- 3:35 Coffee Break - Green Center Lobby

Session: Failure Limits 3 – Metals Hall – Chair: Daniel Green

- 1:50 **Prediction of burst in aluminum tube hydroforming using non-quadratic yield functions**
Y.P. Korkolis¹, S. Kyriakides¹, ¹*University of Texas, Austin, United States (page 479)*
- 2:15 **Strain path effects on the formability of advanced high strength steels evaluated by stretching tests**
David Gutiérrez¹, Toni Lara¹, Daniel Casellas¹, José Manuel Prado^{1,2},
¹*CTM Centre Tecnològic, Manresa (Barcelona), Spain,*
²*Universitat Politècnica de Catalunya, Barcelona, Spain (page 491)*
- 2:35 **Thermo-mechanical FEM of draw-bend formability tests**
Ji Hoon Kim¹, Ji Hyun Sung¹, R. H. Wagoner¹, ¹*Ohio State University, Columbus, OH, United States (page 503)*
- 2:55 **Simulation based prediction of forming limit curves (FLC) using PAM-STAMP 2G**
Fauad El Khaldi¹, Jing Ma¹, Pierre Culière¹, Alain Vaizian¹,
Argiris Kamoulakos¹, ¹*ESI Group, Paris, France (page 513)*
- 3:15 **Measurement of bending properties in strip for roll forming**
Matthias Weiss¹, Henry Wolfkamp², Bernard F. Rolfe¹,
Peter D. Hodgson¹, Eva Hemmerich^{3,7}, ¹*Deakin University, Geelong, VIC, Australia,*
²*Australian Roll Forming Manufacturers, Melbourne, VIC, Australia,*
³*RWTH Aachen University, Aachen, Germany (page 521)*
- 3:35 Coffee Break - Green Center Lobby

Tuesday Afternoon Sessions

Session: Sheet Metal Processes 3
Green Center Room 265 - Chair: William Hosford

- 1:50 **Constitutive modelling of aluminum clad sheet for warm forming**
Jonathan Mckinley¹, Hari Simha², Michael Worswick¹,
¹University of Waterloo, Waterloo, ON, Canada, ²AMEC- Nuclear Safety Solutions, Toronto, ON, Canada (page 725)
- 2:15 **Extracting material data for superplastic forming simulations**
Quirin Snippe¹, Timo Meinders², ¹Nikhef, Amsterdam, Netherlands,
²University of Twente, Enschede, Netherlands (page 737)
- 2:35 **Evaluation of die coatings and stamping lubricants in forming galvanized advanced/ultra high strength steels (A/UHSS) using the strip drawing test (SDT)**
Hyunok Kim¹, Soosik Han², Frank Goodwin³, Kyungbo Kim⁴,
Taylan Altan⁴, ¹Edison Welding Institute (EWI), Columbus, OH, United States, ²Kumoh National Institute of Technology, Gumi, Korea,
³International Zinc Association, Durham, NC, United States, ⁴Center for Precision Forming (CPF), the Ohio State University, Columbus, OH, United States (page 749)
- 2:55 **Fiber-reinforced polymers for rapid tooling of deep drawing tools of a high wear resistance**
Joerg Witulski¹, Michael Trompeter¹, A. Erman Tekkaya¹,
¹Institute of Forming Technology and Lightweight Construction - Technische Universität Dortmund, Dortmund, Germany (page 761)
- 3:15 **The FLC, enhanced formability, and incremental sheet forming**
Wilko Emmens¹, D.H. van der Weijde², Ton van den Boogaard¹,
¹University of Twente, Enschede, Netherlands, ²Corus, IJmuiden, Netherlands (page 773)
- 3:35 Coffee Break - Green Center Lobby

Session: Materials Characterization and Numerical Analysis 4
Petroleum Hall - Chair: Lutz Kessler

- 4:05 **Forming parameter sensitivity**
Sumit Hazra¹, David Williams¹, Rajat Roy¹, Richard Aylmore²,
Alan Smith³,
¹University of Warwick, Coventry, United Kingdom, ²Land Rover,
Warwick, United Kingdom, ³Jaguar Cars Ltd, Coventry, United
Kingdom (page 295)
- 4:25 **A global optimization of load path design for tube hydroforming
applications using MOGA**
Honggang An¹, Daniel Green¹, Jennifer Johrendt¹,
¹University of Windsor, Windsor, ON, Canada (page 307)
- 4:55 **Yield curve determination using the bulge test combined with
optical measurement**
Stefan Keller¹, Walter Hotz², Harald Friebe³, Markus Klein³
¹Hydro Aluminium Research & Development, Bonn, Germany,
²Novelis Innovation Centre, Sierre, Switzerland, ³GOM mbH,
Braunschweig, Germany (page 319)
- 5:05 **Experimental and numerical investigation of the hydraulic bulge
test for accurate flow curve determination**
Alper Güner¹, Alexander Brosius¹, A. Erman Tekkaya¹, ¹Institute of
Forming Technology and Lightweight Construction, Dortmund,
Germany (page 331)
- 5:25 **A case study springback in automobile sheet metal component**
Rahul Hingole¹, Vilas Nandedkar¹,
¹SGGS& Tech, Nanded, India (page 343)

7-10 pm Conference Banquet — Mount Vernon CC

Tuesday Afternoon Sessions

Session: Failure Limits 4 – Metals Hall - Chair: K. Narasimhan

- 4:05 **Automatic FLC-value determination from 4D strain data**
Peter Feldmann¹, Marko Schatz¹, Petra Aswendt¹,
¹*ViALUX Messtechnik + Bildverarbeitung GmbH, Chemnitz, Saxony, Germany (page 533)*
- 4:25 **Determination of the hole expansion properties of AHSS using an optical 3D deformation system**
Andreas Mackensen¹, Matthias Golle¹, Roland Golle¹,
Hartmut Hoffmann¹,
¹*Institute of Metal Forming and Casting; Technische Universität München, München, Bayern, Germany (page 547)*
- 4:45 **Finite element analysis on the effect of sheared edge quality in blanking upon hole expansion of advanced high strength steel**
Robert Wiedenmann¹, Partchapol Sartkulvanich², Taylan Altan²,
¹*Lehrstuhl für Umformtechnik und Gießereiwesen, Technische Universität München, Garching, Germany, ²Engineering Research Center for Net Shape Manufacturing (ERC/NSM), Ohio State University, Columbus, OH 43210, United States (page 559)*
- 5:05 **Critical deformation under shear-tension loading in multistage processes**
Matt Sklad¹, Eisso Atzema², Frank Schouten², M. de Bruine²,
Jozef Verhaeghe¹,
¹*McMaster University, Hamilton, ON, Canada, ²Corus Research Development & Technology, IJmuiden, Netherlands (page 571)*

7-10 pm Conference Banquet — Mount Vernon CC

Tuesday Afternoon Sessions

Session: Sheet Metal Processes 4
Green Center Room 265 - Chair: Wilko Emmens

- 4:05 **Influence of size effects on the process window for deep drawing**
Zhenyu Hu¹, R. Walther¹, Frank Vollertsen¹,
¹*BIAS Bremer Institut fuer Angewandte Strahltechnik, Bremen, Germany (page 785)*
- 4:25 **Fast bending of assembly flanges in automotive structural parts**
Iñaki Eguia¹, Iñaki Perez¹, Ibai Ulacia², Maria Angeles Gutierrez¹,
¹*Labein-Tecnalia, Derio (Bizkaia), Spain, ²Mondragon University, Mondragon (Gipuzkoa), Spain (page 797)*
- 4:45 **Sheet metal shearing and edge characterization of dual phase steels** Xiaoming Chen¹, Changqing Du², Xin Wu³, Xinghai Zhu⁴, Sheng-Dong Liu⁵,
¹*USS, United States, ²Chrysler, LLC, United States, ³Wayne State University, United States, ⁴LSTC, United States, ⁵Generalety, LLC, United States (page 809)*
- 5:05 **Hot stamping of car body parts with local strength adjustment**
Ralf Kolleck¹, Robert Veit¹, Christian Koroschetz¹,
¹*Graz University of Technology, Austria (page 825)*
- 5:25 **Feasible methods applied to the design and manufacturing process of hot forming**
Ning Ma¹, Ping Hu^{1,2}, K.-K. Yan³, W. Guo⁴, X.-B. Meng⁵,
Wenhua Wu², S.-J. Zhai⁶
¹*School of Automotive Engineering, Dalian University of Technology, Dalian, China, ²State Key Laboratory of Structural Analysis for Industrial Equipment, Dalian, China, ³College of Automotive Engineering, Jilin University, Cahngchun, China, ⁴College of Materials Science and Engineering, Jilin University, Changchun, China, ⁵Dalian King Mesh, Dalian, China, ⁶Changchun Vehicle Advanced Forming Technology, Changchun, China (page 835)*

7-10 pm Conference Banquet — Mount Vernon CC

Wednesday June 3, 2009

Session: Materials Characterization and Numerical Analysis 5
Petroleum Hall - Chair: Nico Langerak

- 8:30 **A study regarding material aspects for numerical behaviour of mild steels**
Joerg Gerlach¹, Lutz Kessler¹, Michael Linnepe¹,
¹ThyssenKrupp Steel, Duisburg, Germany (page 351)
- 8:50 **Robust springback – The first step of a simulation based springback compensation**
Thomas Schönbach¹, Thomas Bauer²,
¹AutoForm Engineering Deutschland GmbH, Pfaffenhofen, Germany,
²AutoForm Engineering Deutschland GmbH, Dortmund, Germany
(page 361)
- 9:10 **A theoretical–experimental method to determine Bauschinger effects on sheet metal under bending reversals**
Luis Sanchez¹, ¹University of Colorado Denver, Denver, CO,
United States (page 373)
- 9:25 **Sample width influence on springback behaviour of a U-shaped part made from tailor welded stripes**
Aurelian Albut¹,
¹University of Bacau, Bacau, Romania (page 385)
- 9:40 **Springback simulation of a channel draw process**
Abbas Ghaei¹, Aboozar Taherizadeh¹, Daniel Green¹,
¹University of Windsor, Windsor, ON, Canada (page 393)
- 9:55 **Simulation of weld line movement and its impact on drawability of DP-IF tailor welded blanks**
Adwait Pande¹, P. Sonawane¹, V. Nandedkar¹, K. Narasimhan²,
¹IIT Bombay, Mumbai, Maharashtra, India, ²SGGSIE&T, Nanded,
Maharashtra, India (page 403)
- 10:10 Coffee Break - Green Center Lobby

Session: Failure Limits 5 – Metals Hall - Chair: Abel Santos

- 8:30 **Investigation on the forming limit prediction for aluminium sheet metal alloys**
Ralf Schleich¹, Mathias Liewald², Christian Held¹, Manfred Sindel³,
¹Hochschulintstitute Neckarsulm, Neckarsulm, Germany, ²Institut für Umformtechnik, Stuttgart, Germany, ³Audi AG, Neckarsulm, Germany (page 581)
- 8:50 **Failure characterization of TRIP780 and DP590 sheet steels**
Keunhwan Kim¹, Yuanli Bai², Thomasz Wierzbicki³,
¹POSCO, Seoul, Korea, ²GE Research, New York, United States, ³MIT, Massachusetts, United States (page 593)
- 9:10 **Prediction of limit strains during stamping, tube and sheet hydroforming of DP590 steel**
P. Sonawane¹, Adwait Pande¹, N. Khandre¹, K. Narasimhan²,
¹SGGSIE&T, Nanded, Majarajitra, India, ²IIT Bombay, Mumbai, Maharashtra, India (page 605)
- 9:25 **Formability limits for laminated steel sheets**
James Gerdeen¹, Edmund Chu²,
¹University of Colorado, Denver, CO, United States, ²Alcoa, Alcoa Center, PA, United States (page 617)
- 9:40 **Numerical study of advanced high strength steel piercing and trimming processes using LS-Dyna**
Z. Connie Yao¹, S.D. Liu², Changqing Du³,
¹Nano Precision Product, Camarillo, CA, United States, ²Generalety, Canton, MI, United States, ³Chrysler, Auburn Hills, MI, United States (page 625)
- 9:55 **The effect of tempering on martensitic microstructure and mechanical properties of 22MnB5 steel used for hot stamping**
Mario Saeglitz¹, George Krauss², Dirk Berger³,
¹Hochschule Darmstadt / FBMK, Darmstadt, Germany, ²ASPPRC / CSM, Golden, CO, United States, ³Technical University of Berlin / ZELMI, Berlin, Germany (page 637)
- 10:10 Coffee Break - Green Center Lobby

Session: Sheet Metal Processes 5
Green Center Room 265 - Chair: Alain Col

- 8:30 **Investigation of forming, joining, coating in automobile industry**
Saeid Saber¹, Rudolf Vallant¹, Horst Cerjak¹, H. Schroettner², Josef Hinterdorfer³, Rudolf Rauch³,
¹Institute for Materials Science and Welding, Graz, Austria, ²Institute for Electron Microscopy, Graz, Austria, ³voestalpine Stahl GmbH, Linz, Austria (page 845)
- 8:50 **Comparison of springback behaviour for cylindrical cups manufactured by deep drawing and asymmetric incremental sheet forming (AISF)**
Babak Taleb Araghi¹, Markus Bambach¹, Giuseppe Leonardo Manco¹, Gerhard Hirt¹,
¹Institute of Metal Forming, Aachen, Germany (page 857)
- 9:10 **Finite element validation of a cast iron die shoe**
Michael Pape^{1,2}, J.P. McGuire¹, Greg Pastor¹, Chris Riedel²,
¹Chrysler LLC, Auburn Hills, MI, United States, ²Lawrence Technological University, Southfield, MI, United States (page 869)
- 9:25 **An investigation of complex shape during low pressure tube hydroforming**
Chetan Nikhare¹, Matthias Weiss¹, Peter Hodgson¹,
¹Deakin University, Geelong, VIC, Australia (page 879)
- 9:40 **Driving as a flexible innovative manufacturing method for individualized sheet metal products**
D. Scherer¹, H. Hoffmann¹, B. Lohman¹, T.C. Lueth¹, M. Golle¹, S. Weber¹, M. Markert¹, Z. Yang¹,
¹Technische Universität München, Garching, Germany (page 889)
- 9:55 **Rapid prototyping in traditional decorative metallic pewter parts**
Jorge Lino¹, Rui Neto¹,
¹FEUP, Porto, Portugal, ²INEGI, Porto, Porto, Portugal (page 903)
- 10:10 Coffee Break - Green Center Lobby

Wednesday Morning Sessions

Session: Wednesday Morning
Petroleum Hall - Chair: Chester Van Tyne

- 10:40 **Recent developments in ASTM and ISO standards for sheet metal forming**
Richard Fields¹, ¹*National Institute of Standards and Technology, Gaithersburg, MD, United States*
- 11:00 Survey
- 11:10 **Preview of IDDRG2010**,
Christian Koroschetz, Graz University of Technology, Graz, Austria
- 11:20 **Preview of Tour of Ball Can Plant**
- 11:40 **Closing of Conference**
- 12:00 Lunch - *Friedhoff Hall*

Session: Wednesday Afternoon

- 1–3 pm **Tour of Ball Can Making Plant**, Golden

- P01 **Numerical formulation of forming limit diagram for clad sheet using anisotropic strain-rate potential**
D. Kim¹, K.J. Kim², K. Chung³, F. Barlat⁴, Y.S. Lee¹,
¹*Korea Institute of Materials Science, Changwon, Gyeongsangnam, Korea,* ²*Ssangyong Motor Co., Pyuntaek-si, Gyeonggi-do, Korea,* ³*Seoul National University, Seoul, Korea,* ⁴*Pohang University of Science and Technology, Pohang-si, Gyeongsangbuk-do, Korea (page 917)*
- P02 **Standardization and union of the hydraulic bulge test to determine flow curves**
 Torsten Hallfeldt¹,
¹*German Working Group, Aachen, Germany*
- P03 **Experimental study and simulation of hydroforming tubular stainless steel components**
 Wang G.D.¹, Chan L.C.¹, Chow C.L.²,
¹*The Hong Kong Polytechnic University, Hong Kong, China,* ²*University of Michigan-Dearborn, Dearborn, MI, United States (page 925)*
- P04 **A study on the clad sheet metal of the warm drawability**
Y.S. Lee¹, T.W. Jung¹, D. Kim¹, Y.H. Moon², C.J. Van Tyne³,
¹*Korea Institute of Materials Science, Changwon, Gyeongsangnam, Korea,* ²*Pusan National University, Busan, Korea,* ³*Colorado School of Mines, Golden, CO, United States (page 933)*
- P05 **Feasibility of producing tailored microstructures in hot stamped sheet components**
 Andrea Ghiotti¹, D. Pellegrini¹, Stefania Bruschi²,
¹*DIMEG, University of Padova, Padova, Italy,* ²*DIMS, University of Trento, Trento, Italy (page 941)*

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Conference Overview

MAY 31, 2009

6 p.m.	Registration	CSM Geology Museum
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JUNE 1, 2009

7:45	Registration	Green Center Lobby
8:30	Opening Session - Petroleum Hall	Petroleum Hall
8:45	Monday Morning 1	Petroleum Hall
10:00	Coffee Break	Green Center Lobby
10:30	Monday Morning 2	Petroleum Hall
12:20	Lunch	Friedhoff Hall
1:20	Posters and Exhibits	Green Center Lobby
2:00	Parallel Technical Sessions 1	
3:15	Coffee Break	Green Center Lobby
3:45	Parallel Technical Sessions 2	
6:00	Cocktail Party	Golden Hotel

JUNE 2, 2009

8:30	Tuesday Morning 1	Petroleum Hall
10:10	Coffee Break	Green Center Lobby
10:40	Tuesday Morning 2	Petroleum Hall
12:20	Lunch	Friedhoff Hall
1:20	Posters and Exhibits	Green Center Lobby
1:50	Parallel Technical Sessions 3	
3:35	Coffee Break	Green Center Lobby
4:05	Parallel Technical Sessions 4	
7:00	Conference Banquet	Mount Vernon Country Club

JUNE 3, 2009

8:30	Parallel Technical Sessions 5	
10:10	Coffee Break	Green Center Lobby
10:40	Wednesday Morning	Petroleum Hall
12:00	Lunch	Friedhoff Hall
1:00	Ball Can Plant Tour (optional)	

Parallel Technical Sessions:

Materials Characterization & Numerical Analysis	Petroleum Hall
Failure Limits	Metals Hall
Sheet Metal Processes	Green Center Room 265



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