THE 11TH INTERNATIONAL CONFERENCE ON NUMERICAL METHODS IN INDUSTRIAL FORMING PROCESSES

NUMIFORM 2013

Shenyang, China 6 – 10 July 2013



EDITORS

Shi-Hong Zhang Institute of Metal Research, Shenyang, China

Xiang-Hua Liu Northeastern University, Shenyang, China

Ming Cheng Institute of Metal Research, Shenyang, China

Juan Li Institute of Metal Research, Shenyang, China

All papers have been peer reviewed.

SPONSORING ORGANIZATIONS

Chinese Academy of Sciences (CAS) National Natural Science Foundation of China (NSFC) Chinese Society for Technology of Plasticity (CSTP) Shenyang Science and Technology Bureau TRANSVALOR S. A.



Melville, New York, 2013 AIP I CONFERENCE PROCEEDINGS ■ 1532

Editors

Shi-Hong Zhang Institute of Metal Research Chinese Academy of Sciences Specialized Materials and Devices Division 72 Wenhua Road, Shenyang China

E-mail: shzhang@imr.ac.cn

Xiang-Hua Liu Northeastern University State Key Laboratory of Rolling and Automation No.11, Lane 3, Wenhua Road, Shenyang China

E-mail: liuxh@mail.neu.edu.cn

Ming Cheng Institute of Metal Research Chinese Academy of Sciences Specialized Materials and Devices Division 72 Wenhua Road, Shenyang China

E-mail: mcheng@imr.ac.cn

Juan Li Institute of Metal Research Chinese Academy of Sciences Specialized Materials and Devices Division 72 Wenhua Road, Shenyang China

E-mail: lijuan@imr.ac.cn

Authorization to photocopy items for internal or personal use, beyond the free copying permitted under the 1978 U.S. Copyright Law (see statement below), is granted by AIP Publishing LLC for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$30.00 per copy is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923, USA: http://www.copyright.com. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Services is: 978-0-7354-1156-2/13/\$30.00

© 2013 AIP Publishing LLC

No claim is made to original U.S. Government works.

Permission is granted to quote from the AIP Conference Proceedings with the customary acknowledgment of the source. Republication of an article or portions thereof (e.g., extensive excerpts, figures, tables, etc.) in original form or in translation, as well as other types of reuse (e.g., in course packs) require formal permission from AIP Publishing and may be subject to fees. As a courtesy, the author of the original proceedings article should be informed of any request for republication/reuse. Permission may be obtained online using RightsLink. Locate the article online at http://proceedings.aip.org, then simply click on the RightsLink icon/"Permissions/Reprints" link found in the article abstract. You may also address requests to: AIP Publishing Office of Rights and Permissions, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA; Fax: 516-576-2450; Tel.: 516-576-2268; E-mail: rights@aip.org.

ISBN 978-0-7354-1156-2"%Qtki kpcrlRtkpv+ ISSN 0094-243X Printed in the United States of America

AIP Conference Proceedings, Volume 1532 The 11th International Conference on Numerical Methods in Industrial Forming Processes NUMIFORM 2013

Table of Contents

Preface: NUMIFORM2013 Shi-Hong Zhang, Xiang-Hua Liu, and Ming Cheng	1
KEYNOTE PAPERS	
Advanced numerical models for the thermo-mechanical-metallurgical analysis in hot forging	
processes Antonino Ducato, Livan Fratini, and Fabrizio Micari	3
Grain evolution during hot forging Quanlin Jin	15
Ductile damage prediction in metal forming processes: Advanced modeling and numerical	
simulation K. Saanouni	30
Advances on experiment, measure and numerical simulation for behaviors of material processes Pan Zeng, Hong-fei DU, Jia-qing Zhao, Li-ping Lei, Gang Fang, Cao-yang Sun, and Yi Gao	38
A novel stress-accurate FE technology for highly non-linear analysis with incompressibility	
constraint. Application to the numerical simulation of the FSW process M. Chiumenti, M. Cervera, C. Agelet de Saracibar, and N. Dialami	45
Consistency condition for isotropic-kinematic hardening of anisotropic yield functions Kwansoo Chung	57
Advanced material testing in support of accurate sheet metal forming simulations Toshihiko Kuwabara	69
Process modelings and simulations of heavy castings and forgings Dianzhong Li, Mingyue Sun, Pei Wang, Xiuhong Kang, Paixian Fu, and Yiyi Li	81

INVITED PAPERS

Forging tool shape optimization using pseudo inverse approach and adaptive incremental	
approach	
A. Halouani, F. J. Meng, Y. M. Li, C. Labergère, B. Abbès, P. Lafon, and Y. Q. Guo	95

The investigation of 3D temperature field numerical simulation in hot forming of high strength	
P. Hu, L. Ying, D. X. Jiang, D. Y. Shi, G. Z. Shen, X. K. Zhang, and W. Q. Liu	104
Innovative tube forming and joining technologies L. M. Alves and P. A. F. Martins	114
Improvement of stretch flangeability of ultra-high strength sheets by gradually contacting punch Ken-ichiro Mori, Yohei Abe, and Katsunari Norita	122
Study on extrusion of aluminum microchannel flat tube Ding Tang, Qingqing Zhang, Dayong Li, and Yinghong Peng	128
Numerical/experimental investigations about the warm hydroforming of an aluminum alloy	
G. Palumbo, A. Piccininni, P. Guglielmi, V. Piglionico, L. D. Scintilla, D. Sorgente, and L. Tricarico	135
Process modeling and die optimization design of aluminum alloy extrusion profiles used in high-	
Guoqun Zhao, Xuemei Sun, Cunsheng Zhang, Hao Chen, and Yanjin Guan	144
Multi-scale through-process modeling and simulation in precision forming of complex components of difficult-to-deform material H. Yang, X. G. Fan, H. W. Li, H. Li, M. Zhan, Z. C. Sun, L. G. Guo, and Y. L. Liu	150
Description of anisotropy and the Bauschinger effect on various types of steel sheets Fusahito Yoshida, Hiroshi Hamasaki, and Takeshi Uemori	158
Modeling and simulation of austenite grain evolution for heavy forging steel 30Cr2Ni4MoV undergoing hot deformation	
Zhenshan Cui, Cuidong Li, Fei Chen, and Dashan Sui	166
Modelling of the austenite-martensite transformation in stainless and TRIP steels H. J. M. Geijselaers, P. Hilkhuijsen, T. C. Bor, E. S. Perdahcıoğlu, and A. H. van den Boogaard	175
Modelling of stamping of DP steel automotive part accounting for the effect of hard components in the microstructure	
Mateusz Ambrozinski, Krzysztof Bzowski, Michal Mirek, Lukasz Rauch, and Maciej Pietrzyk	183
New routes to advanced simulation of material forming Francisco Chinesta, Adrien Leygue, and Felipe Bordeu	192

Experimental investigations and multiscale modeling of the microstructure evolution and the mechanical properties of a ferritic steel grade during the production process Dirk Helm, Maria Baiker, and Pierre Bienger	197
An insight into the deformation and orientation development of severely plastic deformed aluminum	
A. K. Tieu, G. Y. Deng, C. Lu, L. H. Su, H. T. Zhu, M. Liu, and X. H. Liu	206
Analysis of anisotropy of extruded magnesium alloy AZ31 bar H. Qiao, H. Wang, and P. D. Wu	214
Recent developments in modeling of hot rolling processes: Part I - Fundamentals	
Gerhard Hirt, Markus Bambach, Simon Seuren, Thomas Henke, and Johannes Lohmar	222
Recent developments in modeling of hot rolling processes: Part II - Applications	
Gerhard Hirt, Markus Bambach, Simon Seuren, Thomas Henke, and Johannes Lohmar	231
Framework for springback companyation based on mechanical factor evaluation	
Tetsuo Oya and Naoyuki Naoyuki Doke	239
Theoretical model for forming limit diagram predictions without initial inhomogeneity Mihai Gologanu, Dan Sorin Comsa, and Dorel Banabic	245
Finite element modelling of surface roughness transfer and oxide scale micro deformation in	
metal manufacturing process Zhengyi Jiang, Dongbin Wei, and Heijie Li	254
FEM simulation of hot forging process to predict microstructure evolution	
Shi-Hong Zhang, Hai-Yan Zhang, Hong-Wu Song, and Ming Cheng	262
Designing a feedback control algorithm for the tube hydroforming process Benny Endelt, Ming Cheng, Shihong Zhang, and Karl Brian Nielsen	269
ORAL PAPERS	
Finite element modeling and optimization of quick super-plastic forming for the side wall outer	
panel of London metro vehicle	270
Guoreng wang, Yijin wang, Dongxuan Sun, Xiangxiang Dai, and Kaifeng Zhang	279
Mechanisms of fold formation during flange upsetting of tubular parts T. Schiemann and M. Liewald	284
Efficient formulations for quasi-steady processes simulations: Multi-mesh method, arbitrary	
Lagrangian or Eulerian formulation and free surface algorithms	291
Zioner i ournen, 631 uni ouverne, 646 Kipert, und Konn Kpodzo	271

Simulation of defects in micro-deep drawing of an aluminium alloy foil Syamsul Hadi, Hai-liang YU, Kiet TIEU, and Cheng Lu	298
Modeling of tensional behavior of 22MnB5 boron steel at isothermal conditions by extended crystal plasticity Dan Zhao, Yiguo Zhu, Ping Hu, and Wanxi Zhang	304
3D-FE study on deformation behaviors in cold pilgering of high strength TA18 titanium alloy tube Heng Li, Kaipeng Shi, and He Yang	311
Study on load relaxation based on hot bending and sizing of Ti6Al4V alloy sheet Liu Po, Zong Yingying, Shan Debin, and Guo Bin	317
A simplified pseudo inverse approach for damage modeling in the cold forging process A. Halouani, Y. M. Li, B. Abbès, and Y. Q. Guo	324
Numerical investigations on stress distribution and deformation of shaft-hub-connections manufactured by lateral extrusion F. Dörr, M. Funk, M. Liewald, and H. Binz	331
Numerical simulation of thick sheet slitting processes: Modelling using continuum damage mechanics Y. Ghozzi, C. Labergere, and K. Saanouni	339
Modeling and 2-D discrete simulation of dislocation dynamics for plastic deformation of metal Juan Liu, Zhenshan Cui, Hengan Ou, and Liqun Ruan	345
Multi-field coupled numerical simulation of hot reversible rolling process of GCr15 steel rod Sendong Gu, Liwen Zhang, Jinhua Ruan, Hongyu Mei, Yu Zhen, and Xinhua Shi	354
Numerical investigation of flexible clamp stretch forming Heli Peng, Mingzhe Li, Wenzhi Fu, and You Wang	361
Analysis of roller hemming process for a vehicle tailgate closure Selim Gürgen, Mustafa İlhan Gökler, Haluk Darendeliler, Çetin Cengiz Çelikkaya, and Kemal Erden	367
Research on flow mechanism of material for spur gear in closed extruding fine blanking process Ming Deng and Lu-zhou Liu	375
Numerical simulation for double-roller rolling process with deep-cylinder ring Qian Dong-sheng, Guo Jun, and Hua Lin	381
Construction of sliding constraint surfaces based on QP model in multi-step inverse analysis Weijie Liu, Ping Hu, Ping Zhou, and Xiangkui Zhang	388

Coupled of thermal-mechanical-transformation numerical simulation on hot stamping with static	
P. Hu, D. Y. Shi, L. Ying, G. Z. Shen, Y. Chang, and W. Q. Liu	394
Experimental and numerical determination of thermal forming limit diagrams (TFLD) of high strength steel 22MnB5	
D. Y. Shi, L. Ying, P. Hu, J. D. Lu, X. Zhao, and W. Q. Liu	406
Research on rapid-cooling press hardening process and its effect for formability of ultra high strength steel	
L. Ying, P. Hu, X. Zhao, D. Y. Shi, M. H. Dai, H. Y. Yu, and Y. Chang	414
Analysis of hot forming of a sheet metal component made of advanced high strength steel Sinem Demirkaya, Haluk Darendeliler, Mustafa İlhan Gökler, and Murat Ayhaner	421
Modeling of flow stress constitutive behavior of GH2984 superalloy for the prospective 700 $^\circ\mathrm{C}$ fossil power plant	
Peng Jia, Engang Wang, and Jicheng He	427
Performing drop test simulation via a penalty finite element method based on dynamic implicit scheme	
Shoubing Zhuang and Sam Murgie	434
Application of constitutive model considering nonlinear unloading behavior for Gen.3 AHSS Li Sun and R. H. Wagoner	440
Optimization of the preform shape in the three-stage forming process of the shielded slot plate in fuel cell manufacturing	
Dong-Yol Yang, Chang-Whan Lee, Dong-Woo Kang, In-Gab Chang, and Tae- Won Lee	446
Secondary development of finite element simulation program and experimental verification of multi-step continuous forging	
Qinxiang Xia, Ke Xiang, Ningyuan Zhu, and Asheng Song	452
Numerical and experimental research on extrusion process of a three-cavity aluminum profile Cunsheng Zhang, Guoqun Zhao, Kun Yang, and Yanjin Guan	458
Numerical investigation for formability of aluminum 6016 alloy under non-isothermal warm forming process	
P. Hu, M. H. Dai, L. Ying, D. Y. Shi, K. M. Zhao, and J. D. Lu	464
Coupled numerical simulation of hot stamping process and experimental verification Ye Li, Liang Ying, Ping Hu, Dongyong Shi, Xi Zhao, and Minghua Dai	471
Finite element analysis of roll bit behaviors in cold foil rolling process Liang Hao, Zhengyi Jiang, Dongbin Wei, and Xiawei Chen	478

Preform design optimization for forging process based on the topological approach Yong Shao, Bin Lu, Hengan Ou, and Zhenshan Cui	484
Dissimilar material lap joints by friction stir welding of steel and titanium sheets: Process modeling Gianluca Buffa, Antonino Ducato, and Livan Fratini	491
Advanced techniques and painless procedures for nonlinear contact analysis and forming simulation via implicit FEM Shoubing Zhuang	499
Numerical simulation on shape distortion of superplastic forming Ti-6Al-4V cylinder Shao-song Jiang, Zhen Lu, Bai-ru Li, Guo-feng Wang, and Kai-feng Zhang	505
The numerical investigation of the material behavior of high strength sheet materials in incremental forming Ossama Mamdouh Badr, Bernard Rolfe, Peter Hodgson, and Matthias Weiss	513
Microstructure and strength of a bainitic steel for underground mine equipment Biao Ma, Changsheng Li, Tao Li, and Hao Wang	520
Numerical simulation of fine blanking process using fully coupled advanced constitutive equations with ductile damage C. Labergere, K. Saanouni, S. Benafia, J. Galmiche, and H. Sulaiman	526
Numerical-experimental comparison study regarding single point incremental forming process Valentin Oleksik, Adrian Pascu, Liviu Roca, and Ioan Bondrea	532
Numerical simulation and parametric study of UOE pipe forming process Qiang Ren, Tian-xia Zou, Zong-chen Ji, Da-yong Li, Ying-hong Peng, Jian-zeng Han, Xiao-xiu Wang, and Xin-wen Li	538
Study and numerical analysis on formability of quenching and partitioning steel sheets of auto- body Xing Hu, Yifan Liu, and Lin Zhu	547
Simulation of ejection of moldings using combination of mold filling and thermo-mechanical analyses Alexander Bakharev and David Astbury	555
Numerical simulation and experimental study for the die forging process of a high-speed railway brake disc hub Mingyue Sun, Bin Xu, Long Zhang, and Dianzhong LI	561
Development of finite element analysis method for three-dimensional hot bending and direct quench (3DQ) process Hiroaki Kubota, Atsushi Tomizawa, Kenji Yamamoto, and Nobuhiro Okada	568

Prediction of initial velocity field for fast solution of rolling force by FEM in strip rolling Rui-bin Mei, Chang-sheng LI, Ban Cai, Guang-liang Zhang, and Xiang-hua Liu	574
A pass planning method for multi-hit stretching of heavy forgings by integration of a semi- analytical technique and degrees-reduced finite element Zhenshan Cui, Wen Chen, Dashan Sui, and Juan Liu	581
Integrated modeling of steel refining, casting and rolling operations to obtain design set points for quality steel sheet production Akash Gupta, Prabhash Kumar, Ravikiran Anapagaddi, Niranjan Reddy, Sharad Goyal, A. K. Singh, and K. A. Padmanabhan	588
A discretization method to solve velocity and temperature fields coupling problem in finite element simulation Jingyi Liu and Shuni Song	595
An improved gradient and Newton algorithm for fast rolling problem Shuni Song and Jingyi Liu	602
Surrogate POD models for building forming limit diagrams of parameterized sheet metal forming applications M. Hamdaoui, Guénhaël Le Quilliec, Piotr Breitkopf, and Pierre Villon	607
Development and application of constitutive equation for the hot extrusion of 7A04 aluminum alloy Yanhong Xiao, Zhenshan Cui, and Cheng Guo	616
The strain rate sensitivity and constitutive equations including damage for the superplastic behaviour of 7xxx aluminium alloys Jian Yang, Serge Boude, Eliane Giraud, and Philippe Dal Santo	623
Flow stress prediction for B210P steel at hot working conditions Guangwei Jiang, Hongshuang Di, Yu Cao, Zhongwei Zhang, Yafei Wang, and Pengfei Sui	630
Multi-objective optimization of gear forging process based on adaptive surrogate meta-models Fanjuan Meng, Carl Labergere, Pascal Lafon, and Laurent Daniel	637
Long fiber polymer composite property calculation in injection molding simulation Xiaoshi Jin, Jin Wang, and Sejin Han	644
Experimental and numerical study of TA6V mechanical behavior under different quasi-static strain paths at room temperature G. Gilles, A. M. Habraken, O. Cazacu, T. Balan, and L. Duchêne	651
Multi-level modeling for sensitivity assessment of springback in sheet metal forming J. Lebon, G. Lequilliec, R. Filomeno Coelho, P. Breitkopf, and P. Villon	657

Automatic optimization of a complete manufacturing chain R. Ducloux, M. Barbelet, and L. Fourment	665
Towards energetic consistent transition from damage to fracture Mariana R. R. Seabra and José M. A. Cesar de Sa	671
Genetic algorithm optimization of the forming process in case of a U-shaped part made from tailor welded blanks Albut Aurelian	677
Numerical simulation to improve robustness in sheet metal forming process chains H. Hagenah, M. Geiger, and M. Merklein	683
Flexible roll forming with staggered arranged rollers for the large curved metal plates based on numerical simulation	
Qingshuai Kong, Zhongqi Yu, Xinmin Lai, and Zhongqin Lin	689
Numerical simulations supporting the process design of ring rolling processes V. Jenkouk, G. Hirt, and J. Seitz	695
Post-buckling analysis of thin-walled structures using the SPH method J. Lin, H. Naceur, A. Laksimi, and D. Coutellier	701
DEM simulation of bead packs as fillers in thin-wall tube push bending process Hai Liu, Shi-Hong Zhang, Ming Cheng, Hong-Wu Song, and Jin-Song Liu	708
Modelling of magnesium sheet forming operations D. Steglich and X. Tian	714
Optimization as a support for design of hot rolling technology of dual phase steel strips Danuta Szeliga, Łukasz Sztangret, Jan Kusiak, and Maciej Pietrzyk	718
Ductility enhancement in pulsed uniaxial tension of 304 stainless steel: Experiments and analysis Graham W. Cullen and Yannis P. Korkolis	725
Efficient process design for closure and healing of voids in open die forging of superhigh C-steel	
Seong-Hoon Kang, Hyung-Cheol Lim, Howon Lee, and Young-Seon Lee	733
Dual mesh applied to several incremental forming examples R. Ducloux and E. Perchat	741
Effect of pre-tension amount on formation accuracy of AZ31 as-extruded profile in warm tension-rotation bending process Han Xiao, Shi-hong Zhang, Jin-song Liu, and Ming Cheng	747
The evolution of strain path in cold wire drawing Tianzhang Zhao, Guang-Liang Zhang, Shi-Hong Zhang, Ming Cheng, and Hong-Wu Song	754

Constitutive model of supper-alloy IN690 based on extrusion test Zhongtang Wang, Shihong Zhang, Ming Cheng, and Defu Li	763
Simulation to coating weight control for galvanizing Junsheng Wang, Zhang Yan, Kunkui Wu, and Lei Song	767
A numerical study on intended and unintended failure mechanisms in blanking of sandwich	
L. Chen, C. Soyarslan, and A. E. Tekkaya	774
Experimental research on micro-pit defects of SUS 430 stainless steel strip in cold rolling process Changsheng Li, Miao Li, Tao Zhu, and Gang Huo	780
Springback analysis for the stamping of an automotive part with high strength steel sheet Tzu-Hao Hung, Heng-Kuang Tsai, Chih-Kai Chang, Yu-Hung Hsu, Fuh-Kuo Chen, and Kuo-Hsin Chung	785
Investigation on the innovative impact hydroforming technology Lang Lihui, Wang Shaohua, and Yang Chunlei	791
POSTER PAPERS	
Modeling microstructure evolution in the delta process forging of superalloy IN718 turbine discs Haiyan Zhang, Shihong Zhang, Ming Cheng, and Zhong Zhao	799
Numerical and experimental study of the elimination of shrinkage in complex and small investment castings using water cooling process You-lu Yuan and Zhu-guo Li	805
Study on the metal flow of large marine full-fiber crankshaft processed by TR bending-upsetting method	
Zhen Jia, Bin Xu, Ming-yue Sun, Dian-zhong Li, Jun-jiang Deng, and Ming-jiu He	812
Study on high-temperature deformation and practical application of ultra high strength steel BR1500HS in hot stamping	
Xin Shang, Jie Zhou, Zhu Su, San-zheng Chen, and Hui Li	819
Research on flow stress model and dynamic recrystallization model of X12CrMoWVNbN10-1-1 steel	

Da-shan Sui, Wei Wang, Bo Fu, and Zhen-shan Cui

Transient temperature field simulation for injection mold based on birth and death element	
technique	
Xi-Ping Li, Bin Wang, and Can Yang	838

826

Comparative study on Mannesmann roll piercing processes between Diescher's guiding disk and Stiefel's guiding shoe	
J. M. Cho, B. S. Kim, H. K. Moon, M. C. Lee, and M. S. Joun	843
Investigation on forming limit properties of dual phase steel Libo Pan, Bernard Rolfe, Alireza Asgari, Matthias Weiss, and Zhijian Zhang	850
FEM simulation for cold press forging forming of the round-fin heat sink Kesheng Wang, Yu Han, Haiyan Zhang, and Lihan Zhang	857
Numerical simulation on multi-gripper stretch forming process for sheet metal Y. Wang, M. Z. Li, H. L. Peng, and S. H. Gu	863
A new damping factor algorithm based on line search of the local minimum point for inverse approach	
Yaqi Zhang, Weijie Liu, Fang Lu, Xiangkui Zhang, and Ping Hu	870
Finite element analysis and elimination of wrinkling in auto-body panels based on universal formability technology	
Jie Yan, Xiangkui Zhang, Jianwei Zhang, Ping Hu, and Guojun Zheng	876
Adaptive mesh optimization for improved one-step forming Ping Hu, Mingzeng Liu, Baojun Li, Xiangkui Zhang, and Guozhe Shen	883
Research on formability of Tailor rolled blank in stamping process Hua-Wei Zhang, Li-Zhong Liu, Ping Hu, and Xiang-Hua Liu	891
Modeling of grain growth behavior of S34MnV steel at elevated temperatures Mingyue Sun, Bin Xu, Dianzhong Li, and Yiyi Li	898
Mathematical model for strip surface roughness of stainless steel in cold rolling process Jinshan Chen, Changsheng Li, Tao Zhu, Wenlong Han, and Yong Cao	905
Numerical prediction of microstructure and mechanical properties for the S-rail with tailored	
properties Shouzhao Lu, Lizhong Liu, Ping Hu, Guozhe Shen, Junzhe Gao, and Xiaobo Huo	912
Effect of die shape on H62 brass forming for continuous extrusion based on numerical simulation	
Bing Li, Xiangjun Yao, Xinbing Yun, and Baoyun Song	918
Investigations on numerical simulation of tailored tempering process based on related experiments	
Siying Deng, Guozhe Shen, Ping Hu, Lizhong Liu, and Liang Ying	924
Numerical investigation of viscoelastic flow induced crystallization in polymer processing Yue Mu, Guoqun Zhao, Xianghong Wu, and Guiwei Dong	931

Numerical modeling and experimental analysis of deformation behaviors during electromagnetic flaring process of thin-walled copper tubes Wenyong Luo, Liang Huang, Xianlong Liu, and Jianjun Li	937
Models between Barkhausen noise and coercive force of grain-oriented electrical steel Hao Wang, Changsheng Li, Ban Cai, Deniz Perin, and Nkwachukwu Chukwuchekwa	944
Finite element simulation on thermal mechanical expansion of the automobile rear axle housing Hua-min Liu, Yufeng Zhao, and Fuxin Zhi	949
Numerical analysis of self-pierce riveting of AZ31 magnesium alloy sheets S. L. Han, Y. W. Wu, Q. L. Zeng, and Y. Gao	955
Finite element simulation of conventional and prestressed cutting of Ti6Al4V Ruitao Peng, Xinzi Tang, Yuanqiang Tan, and Xiongwei Liu	962
Numerical and experimental studies for the effects of through-the-thickness shear on formability	
in single point incremental forming Dongkai Xu, Rajiv Malhotra, Jun Chen, Bin Lu, and Jian Cao	969
2D-FEM analysis of rolls temperature field in induction heating process Ban Cai, Hao Wang, Ruibin Mei, and Changsheng Li	977
Analysis on sheet cyclic plastic deformation using mixed hardening model Qun Li, Miao Jin, and Zhu Yuxin	982
Effect of back tension in multi-pass drawing on central bursting defect S. W. Lee, M. C. Kim, H. Y. Ryu, and M. S. Joun	988
FEM analysis of escape capsule suffered to gas explosion Chang-lu Li, Rui-bin Mei, Chang-sheng Li, Ban Cai, and Xiang-hua Liu	995
Application of the inverse analysis for determining the material properties of the woven fabrics	
for macroscopic approach Mihaela Oleksik and Valentin Oleksik	1002
A new approach coupled with the cellular automata to simulate the microstructural evolution of	
AM80 magnesium alloy Xiao Liu, Luoxing Li, and Biwu Zhu	1007
Multi-stage FE simulation of hot ring rolling C. Wang, H. J. M. Geijselaers, and A. H. van den Boogaard	1014
Deformation behavior and energy absorption capacity of multi-cell aluminum profiles during	
quasi-static axial compression Guan Wang, Zhiwen Liu, Dong Xiang, and Luoxing Li	1020

Flow softening behavior during hot deformation processes of 7005 aluminum alloy at medium	
strain rate Luoxing Li, Guan Wang, and Shikang Li	1026
Study on the influence of temperature on the surface asperity in micro cross wedge rolling H. N. Lu, D. B. Wei, Z. Y. Jiang, D. Wu, and X. M. Zhao	1032
Experimental and numerical study of electrically-assisted micro-rolling Rong Fan, Man-Kwan Ng, Dongkai Xu, Ping Hu, and Jian Cao	1038
An automated surface mesh generation based on the 3-D looping algorithm Xinwu Ma and Zhao Guoqun	1044
Forming limit diagram analysis based on crystal plasticity for magnesium alloy sheets Weiqin Tang, Dayong Li, Yinghong Peng, and Shaorui Zhang	1051
Exponential model of strength-hardness mechanical properties analysis and numerical	
prediction in hot stamping M. H. Dai, L. Ying, Z. S. Fan, P. Hu, D. Y. Shi, and B. He	1058
The FE simulation research on roll bending process of complex sheet with padding assisted Tianhai Wei, Yixi Zhao, Bo Song, Baoguo Chen, and Zhongqi Yu	1066
Intelligent design of mechanical parameters of the joint in vehicle body concept design model Wen-bin Hou, Hong-zhe Zhang, Da-jun Hou, and Ping Hu	1073
Electro-thermo-mechanical coupling analysis of deep drawing with resistance heating for	
aluminum matrix composites sheet Kaifeng Zhang, Tuoda Zhang, and Bo Wang	1079
FEM analysis of partial flash processing for a plate Qing-an Chen and Xiang-hua Liu	1085
Finite element modeling and numerical simulation of sintered tungsten components under	
hydrogen atmosphere B. Mamen, J. Song, T. Barriere, and JC. Gelin	1092
Optimized design on condensing tubes high-speed TIG welding technology magnetic control	
Lin Lu, Yunlong Chang, Yingmin Li, and Ming Lu	1100
The mechanical properties of high speed GTAW weld and factors of nonlinear multiple regression model under external transverse magnetic field	
Lin Lu, Yunlong Chang, Yingmin Li, and Youyou He	1106
Study on temperature oscillation phenomenon in FEM numerical simulation Bo Shen, Tao Fan, Zaiyong Pan, Quanlin jin, and Xinyun Wang	1112

Constitutive relationships of hot stamping boron steel B1500HS Huiping Li, Lianfang He, Guoqun Zhao, and Lei Zhang	1118
Research on work roll thermal crown in cold rolling mill Lei Song, Mingang Shen, Xuebo Chen, and Junsheng Wang	1125
Finite element analysis of inclusion effects on high strength steel cord wire drawing Guang-liang Zhang, Tian-Zhang Zhao, and Shi-hong Zhang	1131
Numerical and experimental research on the hydromechanical deep drawing of complex-shaped box Lihui Lang, Yongming Wang, Yasu Xie, and Xiying Yang	1137
Effect of plastic deformation of bulk material on frictional shear stress Tatsuhiro Suzuki, Zhigang Wang, and Yasuharu Yoshikawa	1142
Tribological feature of square cup drawing test Mingxu Yang, Zhigang Wang, Yasuharu Yoshikawa, and Shunsuke Ando	1146
Author Index	1151