

Proceedings of the 14th
International Conference on the
Technology of Plasticity

**Current Trends in the
Technology of Plasticity**

ICTP 2023

**Table of Contents of
Volume 1**

Contents

Volume 1

Forging

Optimization Support Method for Cold and Warm Forging Dies of Non-axisymmetrical Forged Products	3
<i>Ryota Okamoto, Masanobu Umeda, Yuji Mure, Keiichi Katamine, and Kiyoharu Imanaga</i>	
Investigation on Thermal Effect Induced by Ultrasonic Vibration on Surface Deformation Behavior During Micro-forging	15
<i>Zidong Yin and Ming Yang</i>	
Reduction in Barreling of Hollow Cylinder by Combination of Axial Compression and Circumferential Torsion in Upsetting with Conical Dies	27
<i>Ryo Matsumoto, Sotaro Tanaka, and Hiroshi Utsunomiya</i>	
Aluminium-Matrix-Composites (AMC) for Hot Forged Components	36
<i>Marcel Graf, Robert Pippig, Tim Lehnert, Angelika Jedynak, and Sebastian Härtel</i>	
Forming of Spur Gear by Combination of Divided Flow Forging and Slide Motion by Using Liquid Lubricant	48
<i>Akira Yanagida, Masataka Kawata, Tatsunori Soga, and Ziyin Wang</i>	
Shear Forging for Aluminum and Copper Materials	56
<i>Tomoyuki Hakoyama, Hibiki Kojima, Souma Hibino, Ryo Yoshitake, and Zhigang Wang</i>	
Non-Heat-Treated Steel for Manufacturing Automotive Part	64
<i>Youngyun Woo, Yeongseon Lee, Eunyoo Yoon, Yoonuk Heo, and Changgon Jeong</i>	
Numerical and Experimental Investigation of Deformation Characteristics During High-Frequency Radial Forging of AA7075	72
<i>Saeed Tamimi and Jianglin Huang</i>	
Deformation Behavior of Tool and Workpiece in Plate Compression	80
<i>Tomoyuki Hakoyama, Kenta Jo, Yasuharu Yoshikawa, and Zhigang Wang</i>	

Automated Preform Design for the Development of Multi-stage Hot Forging Technology	88
<i>Nikolay Biba, Sergey Stebunov, Andrey Vlasov, Kuanysh Kenzhaliyev, and Alexey Duzhev</i>	
Reduction of Forging Load by Applying Lateral Oscillation	99
<i>Kenji Hirota and Naoki Hashida</i>	
A Case-Based Reasoning System Combining Expert Knowledge for Automated Design of Multi-Pass Hot Forging for Hub Bearings	106
<i>Jiawei Xu, Jingyun Zhao, Shaoshun Bian, Debin Shan, and Wenchen Xu</i>	
Integration of FEM and Process Map to Determine the Formability of a Continuous Cooling Bainitic Steel	118
<i>T. M. Ivaniski, A. C. de F. Silveira, J. Epp, and A. da S. Rocha</i>	
Preform Design for Flash-Less Die Forging	129
<i>Karthikeyan Kumaran and Gracious Ngaile</i>	
Rolling	
Rolling of Cylindrical Parts with External Cross Ribs	143
<i>Xinghan Chen, Zhongqi Yu, Yixi Zhao, and Zhengwu Zhu</i>	
Study on the Behavior of Rotating Material Around the Pass Line at Exit with Caliber-Rolling for Wire and Rod	151
<i>Ryota Ifuku and Hitoshi Kushida</i>	
Development of Inverse Method to Estimate Stresses on the Roll Surface During Rolling	162
<i>Yasushi Maeda, Yasuyuki Fujii, and Takuya Shiraishi</i>	
Development of Dimensional Control Technology for Seamless Steel Pipe Rolling by Controlling Circumference Length in Sizing Mill	173
<i>Yusuke Yoshimura, Shunsuke Sasaki, Tatsuro Katsumura, and Masaru Miyake</i>	
Deformation Characteristics and Microstructure Evolution of GH4169 Alloy Bars with α -phase in Flexible Skew Rolling	184
<i>Huibo Zhang, Baoyu Wang, Chuanbao Zhu, Yunsheng Li, and Jian Yin</i>	
Temperature Control During the Process Combination Welding and Rolling for Enabling Full Recrystallization with Homogenized Grain Size Distribution	192
<i>Benjamin Sydow and Sebastian Härtel</i>	

Lateral Spread in Industrial Hot Rolling Processes	203
<i>Baohui Tian, Siegfried Kleber, Christoph Turk, Stefan Tolliner, Silvia Schneller, and Peter Markiewicz</i>	
New Discoveries in Cold Rolling: Understanding Stress Distribution and Parameter Dependence for Faster, More Accurate Models	211
<i>Francis Flanagan, Doireann O'Kiely, Alison O'Connor, Mozhdeh Erfanian, and Edward James Brambley</i>	
New Models for Cold Rolling: Generalized Slab Theory and Slip Lines for Fast Predictions Without Finite Elements	223
<i>Mozhdeh Erfanian, Edward James Brambley, Francis Flanagan, Doireann O'Kiely, and Alison O'Connor</i>	
Effect of Cr Concentration and Oxide Scale Composition in Hot Rolling Tools	234
<i>Jun Akaike, Tatsuro Katsumura, and Masaru Miyake</i>	
Innovative ASR Technology for Profile Contour and Flatness Control of Electrical Steel in Multiple-Width Schedule Free Rolling	244
<i>Jianguo Cao, Chunning Song, Leilei Wang, Qiufang Zhao, Jing Xiao, and Lei Sun</i>	
Fast Numerical Model for Predicting Residual Stresses in Hot Rolled Profiles Taking into Account Phase Transformations in Steel	254
<i>Andrij Milenin, Szczeban Witek, Lukasz Rauch, Ivan Milenin, Roman Kuziak, and Maciej Pietrzak</i>	
Examination of a Composite Ring Rolling Process with Different Wall Thicknesses to Produce a Ring of 1.7225 and 1.4462 in FEM and Experiment	266
<i>Laurenz Kluge, Stefan Stergianou, David Bailly, and Gerhard Hirt</i>	
A Study of Void Closure in Hot Rolling Bars of Stainless Steel	275
<i>Arianna Favre, Raffaele Valente, Dimitri Olivero, Marco Baisotti, and Lorenzo Viotto</i>	
Numerical Modeling of the Redistribution of Residual Stresses in Deep Rolled Cross Bores in Shafts from GJS700-2	283
<i>Lars Uhlmann, Felix Reissner, Shashaank Nambala Rathnakar, Tim Herrig, Jörg Baumgartner, and Thomas Bergs</i>	

Physical and Numerical Modeling of Micro-extrusion Behavior of AA3xxx Aluminum Alloy in Cold Roll Bonding	291
<i>Mahsa Navidirad, John E. Plumeri, Natasha Vermaak, Masashi Watanabe, and Wojciech Z. Misolek</i>	
Simulation of the Third Octave Chatter Phenomenon Using a Numerical Model for a Tandem Cold Rolling Mill	299
<i>Benjamin Claudet, Julien Francken, and Guilherme Monteiro Garcia</i>	
Asperity Forming Using Printed Tools in Rolling	309
<i>Yasuhiro Yoshikawa, Takumi Nishiyama, and Misaki Sakamoto</i>	
Towards a Generalized Template for Smart Manufacturing Use Cases	321
<i>Xiawei Feng and Lu Ding</i>	
An Experimental Study of Flexible Skew Rolling Bar Process	329
<i>Xiaocheng Wu, Longfei Lin, Wenfei Peng, Yiyu Shao, and He Li</i>	
The ERW Tube Cold Roll Forming Simulation with Different Cage Roll Arrangement and Fin-Pass Design	338
<i>Jinn-Jong Sheu and En-Xuan Jian</i>	
Hot Rolling Modelling: Optimization of Trimmed Area Based on Crocodile and Edge Cracking Simulations	346
<i>Laurent Nguyen, Alexandre Barthelemy, and Anthony Harrup</i>	
Extrusion	
A Low Force Extrusion Technique for Producing Wide-Thin Aluminium Panels	361
<i>Jiaxin Lv, Weishu Li, Junquan Yu, Zhusheng Shi, and Jianguo Lin</i>	
Wear Analysis of Hot Extrusion Punch for Large Fan Shaft Based on Archard Wear Theory	371
<i>Zuofa Liu, Xinrui Xiao, Wenwu Zhou, Zhoutian Wang, Haicheng Zhang, and Jie Zhou</i>	
Improvement of Mechanical Property Variation in Rapidly Solidified Al-Fe Alloy Hot Extruded Material for Electrical Conductors by Composition Gradient Control of the Billet	381
<i>Ryohei Kobayashi, Toru Maeda, Tatsuya Funazuka, and Tomomi Shiratori</i>	
Influence of Materials and Its Conditions on Pin-Extrusion from Sheet Metal	389
<i>Martin Kraus and Marion Merklein</i>	

Simulative Model for the Feasibility Study and Stress Analysis of Full Dense Rods and Pipes Produced by Friction Stir Extrusion	398
<i>Sara Bocchi, Gianluca D'Urso, and Claudio Giardini</i>	
Pass-Schedule Design for Non-circular Wire Drawing	407
<i>Atsushi Sasaki, Motohiro Nakano, Hajime Takao, and Hiroshi Utsunomiya</i>	
Exploring a Novel Process for Reducing Aluminum Extrusion Process Scrap	418
<i>Gregory J. Oberhausen and Daniel R. Cooper</i>	
Processability of Mg-Gd Powder via Friction Extrusion	431
<i>Lars Rath, Chang Chan, Uceu Suhuddin, Hendrik Buresch, Thomas Ebel, and Benjamin Klusemann</i>	
Assessment of Recently Developed Low-Force Extrusion Methods for Manufacturing Aluminium Vehicular Hydrogen Tank Liners	442
<i>Qian Cheng, Ruiqiang Zhang, Zhusheng Shi, and Jianguo Lin</i>	
Comparison of Stationary and Movable Valves for Continuous Hot Extrusion	450
<i>Johannes Gebhard, André Schulze, and A. Erman Tekkaya</i>	
Novel Extrusion Process for the Production of Aluminum-Polymer-Composites	459
<i>Patrick Kotzyba, Johannes Gebhard, André Schulze, Fabian Günther, Markus Stommel, and A. Erman Tekkaya</i>	
Effect of Die Design on Charge Welds in Aluminium Extrusion	468
<i>Eren Can Sariyarlioglu, Marco Negozio, Jun Ma, Torgeir Welo, and Geir Ringen</i>	
Experimental and Numerical Investigation of the Forming Zone in Dieless Wire Drawing Process of Thin Biometallic Wires	479
<i>Merle Braatz, Jan Bohlen, and Noomane Ben Khalifa</i>	
On-Demand Fabrication of Composites with Prescribed Properties by Multifilament Cold Extrusion	491
<i>Hiroshi Utsunomiya, Daisuke Taniguchi, Jyoji Miyamoto, and Ryo Matsumoto</i>	
Numerical Investigation of Full Forward Extrusion with Downstream Strain Hardening via Deep Rolling	500
<i>P. Herrmann, M. Müller, I. F. Weiser, Tim Herrig, and Thomas Bergs</i>	

- Influence of Process Parameters and Die Design on the Microstructure and Texture Development of Direct Extruded Magnesium Flat Products 511
Maria Nienaber, Nabil Safieh, Jan Bohlen, and Noomane Ben Khalifa

- Influence of Material Flow on Forming Conditions in Backward Cup Extrusion 522
Kazuhito Asai and Kazuhiko Kitamura

- Minimizing Quench Distortion and Improving the Toughness of Complex Hollow Extrusions Using Internal Cooling 531
Ala'aldin Alafaghani, Lillian Adams, Pingsha Dong, and Daniel Cooper

Tube Forming

- Segmentation Method for Bending Tools – Fundamental Investigation of Profile Forming by Segmented Tools 547
Jonas Reuter, Peter Frohn-Sörensen, and Bernd Engel

- Process Development for Passive Granular Media-Based Tube Press Hardening 560
Florian Kneuper, Joshua Grodotzki, and A. Erman Tekkaya

- Forming Quality Indices for Tube Roll Forming: Definition and Modelling 569
Enrico Simonetto, Qiaoling Wang, Andrea Ghiotti, and Stefania Bruschi

- Limitations of a New Forming Process for Vault Structured Recuperator Tubes 577
Andreas Neumann and Sebastian Härtel

- Local Thickening of Thin-Walled Tubes by Boss Forming 584
J. P. G. Magrinho, M. B. Silva, and P. A. F. Martins

- Effect of Material on Strain Direction in Tube Expansion Drawing Process 594
Shiliang Zhang, Takashi Kuboki, Masayoshi Akiyama, and Shohei Kajikawa

- Studies on Flow-Forming of Hybrid Components 603
Robert Laue, Clemens Anger, and Birgit Awiszus

- Square Tube Fabrication by Expansion Drawing of Circular Tube 612
Shohei Kajikawa, Yusuke Kato, Shiliang Zhang, Takashi Kuboki, and Masayoshi Akiyama

Modelling of Tube Hydroforming Process: Identification of Best Process Parameters and Comparison Between Different FE Models	622
<i>Andrea Abeni, Paola Ginestra, Antonio Fiorentino, Aldo Attanasio, and Elisabetta Ceretti</i>	
Modular Tool Setup for Internal Flow-Turning of Wall Contour Optimised Tubes	631
<i>Eugen Wiens, Lorenz Albracht, and Werner Homberg</i>	
Effect of Friction on Corner Filling Deformation in Tube Hydroforming Process by Real-Time Measurement	642
<i>Xiao-Lei Cui, Qianxi Sun, and Shijian Yuan</i>	
Numerical Simulation of Residual Stress in the JCO-Welding-Calibration Whole Process Forming of the Submarine Pipeline Pipes	653
<i>Shaocong Qi, Gaochao Yu, and Siguo Chen</i>	
Incremental Forming	
On the Relevance of Modeling Options in ABAQUS Regarding the Spinning Process Simulation	667
<i>Akla-Essoh Claude Korolakina, Pierre-Olivier Bouchard, Katia Mocellin, Ahmed Mehdi Roula, Anne Lepied, and Sjoerd Van der Veen</i>	
Distortion Reduction in Incremental Beading	680
<i>Derick Suarez, Lu Huang, Hui-ping Wang, Joshua Solomon, Nathan Sigmund, and Jian Cao</i>	
Numerical Approach to Model a Novel Electrohydraulic Incremental Forming Process for the Manufacture of Pillow Plate Heat Exchangers	692
<i>Maik Holzmüller, Yi Gong, Fabian Bader, Armin Henke, and Werner Homberg</i>	
Tailored Heat Treatment Strategy for the Orbital Forming of Functional Components from EN AW-7075	702
<i>Andreas Hetzel, Michael Biburger, Michael Lechner, and Marion Merklein</i>	
Modelling of Stress Evolution and Its Effect on Formability in Tension Under Cyclic Bending Plus Compression	713
<i>Wenxuan Peng and Hengan Ou</i>	

Analysis and Modelling of the Deformation in the Manufacture of Flange-Contours by the Combined Friction-Spinning and Flow-Forming Process	722
<i>Frederik Dahms and Werner Homberg</i>	
Controlling Product Properties by Compressive Stress-Superposed Incremental Forming	731
<i>F. Maqß, M. Hahn, and A. E. Tekkaya</i>	
Temperature Control of the Two-Point Incremental Forming Process to Achieve Homogeneous Martensite Content Based on Finite Element Simulations	739
<i>Johannes Buhl, Lemopi Isidore Besong, and Sebastian Härtel</i>	
Electrically-Assisted Incremental Forming of Invar 36 Sheet	748
<i>He Zhou, Yu Zhu, Xiaoqiang Li, Hongrui Dong, Yixin Wang, and Jingyu Hou</i>	
Surface and Friction Characterisation of Rotational Vibration-Assisted Incremental Sheet Forming	756
<i>W. X. Peng, E. Hurtado Molina, F. A. Solum, J. Booth, and H. Long</i>	
Modelling and Mechanics of Shear Spinning	766
<i>Mustafa Can Uzun and Omer Music</i>	
A Hybrid Incremental Sheet Forming Process for Fabricating Functional Surface Microtextures	775
<i>Ganglin Zhao, Yanle Li, Feifei Liu, Deshun Gao, Hao Yuan, and Fangyi Li</i>	
Stress Relief in WAAM SS316L Flow-Formed Tube	784
<i>G. G. Goviazin, D. Rittel, and A. Shirizly</i>	
Robotic SPIF Numerical Chain Development and Validation	791
<i>Sandra Chevret, Idriss Tiba, Yessine Ayed, Daniel Maldonado, Viet Duc Le, Tudor Balan, and Philippe Dal Santo</i>	
Author Index	799

Proceedings of the 14th
International Conference on the
Technology of Plasticity

**Current Trends in the
Technology of Plasticity**

ICTP 2023

**Table of Contents of
Volume 2**

Contents

Volume 2

Sheet Forming

A New Type of CubeSat Structure Utilizing the Superplastic Forming Process	3
<i>Yaqoob Alqassab and Firas Jarar</i>	
Flattening of Pyramidal Asperities Under Combined Normal Loading and In-Plane Biaxial Straining	12
<i>Maximilian Zwicker, Úlfar Arinbjarnar, Maximilian Knoll, Niels Bay, and Chris V. Nielsen</i>	
Concept for the Incorporation of Auxetics as Active Die Faces for Flexible Metal Forming Tools	20
<i>Peter Frohn-Sörensen, Jonas Reuter, and Bernd Engel</i>	
Investigation of Measures for Material Flow Control for a Backward Extrusion of Geared Components from Coil	32
<i>Miriam Leicht, Johannes Henneberg, and Marion Merklein</i>	
Research on the 5A06 Aluminum Alloy Thin-Walled Elbow in Cold Stamping Condition	43
<i>Xiaomin Huang, Ben Guan, and Yong Zang</i>	
Optimization of Stamping Process Parameters for Small Curved Beam Parts of Rail Train Based on GA-PSO-BP Algorithm	51
<i>Hongchao Ji, Mengmeng Li, Ran Yao, and Weichi Pei</i>	
Novel Fabrication of Ultra-thin Copper/SS304L Composite Microchannels	59
<i>Mengyuan Ren, Haibo Xie, Fei Lin, Fanghui Jia, Mingshuai Huo, Hui Wu, Shengnan Yuan, Ming Yang, Ken-ichi Manabe, and Zhengyi Jiang</i>	
An Exploration of the Process Operating Window for Folding-Shearing in a Press-Tool	70
<i>Rishabh Arora, Omer Music, Christopher J. Cleaver, and Julian M. Allwood</i>	
Plate Roll Embossing Process - The Efficient and Flexible Embossing of Sheet Metals	78
<i>David Briesenick, Mathias Liewald, and Pascal Heinzelmann</i>	

Tailoring the Hardness in Multi-stage Press Hardening of 22MnB5 Sheet Material in a Progressive Die	90
<i>Juri Martschin, Malte Wrobel, Joshua Grodotzki, and A. Erman Tekkaya</i>	
Evaluation of Required Diameter Adjustment of a Novel Ironing Punch Concept for Reducing Wear During Retraction	101
<i>Kaarel Siimut, Úlfar Arinbjarnar, Kasper M. Madsen, Ermanno Ceron, Thomas L. Madsen, and Chris V. Nielsen</i>	
Investigation of Biaxial Prestrain Influence on Bending-Under-Tension Springback	110
<i>Y. Yang, C. Baudouin, H. Chalal, G. Vincze, and T. Balan</i>	
Simulation-Based Investigation of the Heat Exchange Within a Partial Hot Stamping Process	116
<i>Alborz Reihani, Darwin Badroosian, Sebastian Heibel, Thomas Schweiker, and Marion Merklein</i>	
Influencing Parameters in the Deep Drawing of Fiber Metal Laminates with Low Viscous Matrix	124
<i>Moritz Kruse and Noomane Ben Khalifa</i>	
Quantification of the Impact of Forming-Induced Residual Stresses on Subsequent Cutting Operations for Aluminum AA7075 Thick Sheets	135
<i>Michael Ott, Moritz Mayer, Yiran Li, Florian Steinlehner, Michael F. Zaeh, and Wolfram Volk</i>	
Approximation of Pressure Fields Generated by High-Voltage Discharges in Liquid on a Flat Wall	146
<i>M. Knyazyev, M. Holzmüller, and W. Homberg</i>	
Investigation of Necking and Fracture Strain Limits of Medium-Mn Steel Sheet Under Hot Stamping Conditions	158
<i>Chenpeng Tong, Ruiqiang Zhang, Dechao Xu, and Zhusheng Shi</i>	
A Novel Insight into the Mechanism of Plastic Instability Behavior from the Mesoscopic-Scale Strain Analysis in Medium Mn Steel	167
<i>Shuai Zhao, Renbo Song, Yingchao Zhang, Weifeng Huo, YongJin Wang, and Changhong Cai</i>	
Investigation of Hot Stamping with Cooled and Textured Tools Manufactured by Directed Energy Deposition	174
<i>Anna Komodromos, Gabriel Marín, Joshua Grodotzki, and A. Erman Tekkaya</i>	

Forming Limit of Dual Phase Steel: An Experimental and Numerical Investigation	184
<i>Martina Müller, Niklas Fehlemann, Tim Herrig, David Lenz, Markus Könemann, Thomas Bergs, and Sebastian Münstermann</i>	
Development of the One-Step Hybrid Forming Process to Produce an Al-GMT-Hybrid Crash Management System	194
<i>Amir Hajdarevic, Saarvesh Jayakumar, Lorenz Stolz, and Xiangfan Fang</i>	
Simplified Calibration of an Academic Refined Model for Industrial Use	206
<i>W. Liegard, L. Charleux, E. Roux, P. Balland, and L. Tabourot</i>	
Development of Warm and Cold Tube Forming of Ti-6Al-4V Alloy by Press Forming	213
<i>Y. Okude, T. Iwaoka, I. Nakamura, T. Muraoka, and T. Katagiri</i>	
Real Time Monitoring of Friction Variation in Stamping Process Using Die-Embedded Sensing System	223
<i>Ming Yang and Takunori Kyuno</i>	
Contact Conditions and Temperature Distribution During Cryogenic Deep Drawing with Macro-structured Tools	233
<i>Marc Tulke, Rémi Lafarge, Alexander Wolf, and Alexander Brosius</i>	
Numerical and Experimental Forming of a Cylindrical Cup in 7075-T6 Under Warm Temperature Conditions	244
<i>S. Royne, H. Laurent, and A. Maillard</i>	
The Bending Method for Sheet Metal Having Widely Thickness Change in More Than Three Times Thickness Range by Press Brake with Variable Punches	252
<i>Hideki Okada, Naoya Hirano, Tsuyoshi Kimura, Hiroki Oribe, Takumi Wada, Shunya Azami, and Takashi Kitahata</i>	
Development of a Demonstator Plant for Hot Stamping of Metal Sheets with a Machine Learning Assisted Anomaly Detection Control System	261
<i>Felix Neubürger, Joachim Arens, Thomas Kopinski, and Matthias Hermes</i>	
On Forming Sheet Metal Parts in Single Curvature with English Wheel	274
<i>Kuang-Jau Fann and Yi-Hsien Wu</i>	
Prediction of Wear in Roll Forming Using Data-Based Analysis and Modeling	285
<i>Marco Becker, Patrick Schuster, and Peter Groche</i>	

Estimation of Kinematic Hardening of Sheet Metals Based on Stress-Relaxation Behavior	297
<i>Kouki Matsugi, Kazuhiro Ikeda, Takumi Araki, and Ryutaro Hino</i>	
Superplastic Rectangular Bulging of AA8090 Numerical Modeling: Validation and Development	305
<i>Abdellah Lahbabi, Kenza Bouchaala, Mustapha Faqir, and Elhachmi Essadiqi</i>	
An Innovative Deep Drawing Process of Thin Curved Shells with Positive Local Bulging	314
<i>Wen Sun, Wei Liu, Yonggang Hao, Yongchao Xu, and Shijian Yuan</i>	
Cryogenic Forming Process and Equipment for Aluminum Alloy Thin Shells	322
<i>Xiaobo Fan, Xianshuo Chen, and Shijian Yuan</i>	
Comparison of Critical Shear Strain Evaluations for Simple Shear Test	332
<i>Guofeng Han, Enzhen Ren, Ji He, and Shuhui Li</i>	
Mechanics and Materials for Sheet Metal Forming” In Honor of Prof. Fred Barlat	
Affordable Multi-scale Numerical Simulation of Structures in Anisotropic Plasticity and Damage	343
<i>Gilles Rousselier</i>	
Inverse Identification of the YLD2000-2D Yield Locus Exponent for Stainless Steel 1.4301 Using a Time-Dependent Optimization Method	351
<i>Konrad Barth, Mohamadreza Afraasiabi, and Markus Bambach</i>	
Capability Testing of Layered Specimens in Plane Strain Compression Method	363
<i>Dániel Gy. Szőke, Martin L. Kölüs, Richárd Borbély, and Gábor J. Béres</i>	
Measurement and Analysis of Elasto-Plastic Deformation Characteristics of Aluminum Alloy Sheet Subjected to Non-linear Stress Paths Without Intermediate Elastic Unloading	373
<i>Shunsuke Asari and Toshihiko Kuwabara</i>	
Characterization of the Flow Behavior of a Ti6Al4V Alloy Considering the Temperature Change of the Specimen During Cylinder Compression	381
<i>Su Min Ji, Mohd Kaswandee Razali, Jeong Muk Choi, and Man Soo Joun</i>	

Flow Behavior of an A6082 Alloy at Elevated Temperature and Precision Finite Element Prediction of Its Hot Forging Process of an Automotive Part	394
<i>Jeong Hwi Park, Nurhidayah Abd Hamid, Jong Bok Byun, Su Min Ji, Jeong Muk Choi, and Man Soo Joun</i>	
Measurement and Analysis of the Strength Differential Effect of 5000 Series Aluminum Alloy Sheet	406
<i>Kaisei Akiyama, Ren Tachibana, Toshihiko Kuwabara, and Takeo Sakurai</i>	
Application of Barlat's Yld 2000-2d Yield Stress Function for Modeling the Anisotropic Plastic Behaviour and the Forming Limit Strain Curve	415
<i>José Divo Bressan and Mauricio Vicente Donadon</i>	
The Role of Local Crystallographic Texture on Strain Localization at Weld Seams in Al-Mg-Si Porthole Die Extrusions	427
<i>Andrew Zang, Jean-François Béland, Yu Wang, Nick Parson, and Warren J. Poole</i>	
Integration of Local Formability Limits of AHSS into Local/Global Formability Map	435
<i>Hyun-ho Bok and Jongwon Choi</i>	
Characterization of the Dynamic Recrystallization Kinetics Using Directly Flow Stress Model and Its Application to 42CrMo Steel	442
<i>Mohd Kaswandee Razali, Suk Hwan Chung, Missam Irani, Jeong Muk Choi, and Man Soo Joun</i>	
Forming Limit Prediction of Multi-layered Metal-Polymer Sheet Using Enhanced Marciniak-Kuczynski Model with Non-associated Hill48 Plasticity	455
<i>Yong Hou, Chanmi Moon, Qi Hu, Jung-Hyeon Park, Aishwary Gupta, Junhe Lian, and Myoung-Gyu Lee</i>	
Determination of Optimized Biaxial Cruciform Specimens of Mild Steels, SS 316L, and Aluminum Alloys	463
<i>Dilip K. Banerjee, Mark A. Iadicola, and Evan Rust</i>	
Examination of Bending Stress Superposition Effect on Martensite Transformation in Austenitic Stainless Steel 304	475
<i>Elizabeth M. Mamros, Lenard A. Polec, Fabian Maafß, Till Clausmeyer, A. Erman Tekkaya, Jinjin Ha, and Brad L. Kinsey</i>	
Temperature-Dependent Plasticity and Fracture Properties of Modern BCC Steels	486
<i>Fuhui Shen, Hao Xu, Sebastian Münnstermann, and Junhe Lian</i>	

Improving Formability of Titanium Bipolar Plate via Hot Stamping	494
<i>Xianglu Zhang, Nan Guo, Wenyao Wang, Zhuoqi Yan, Daijun Yang, Junying Min, Pingwen Ming, and Cunman Zhang</i>	
Effect of the Choice of Data Used for Analytical Identification of Orthotropic Criteria for Aluminum Extrusions	503
<i>Oana Cazacu and Benoit Revil-Baudard</i>	
Influence of the Initial Microstructure on the Mechanical Behavior During Forming for Inline Manufacturing Process Routes	513
<i>Avantika Jhanji, Benjamin Sydow, Tom-Eric Adams, Stefan Habisch, and Sebastian Härtel</i>	
A Robust Method to Determine True Stress–true Strain Curves for Sheet Metals at High Temperatures	525
<i>Ruiqiang Zhang, Siyi Chen, and Jianguo Lin</i>	
A Framework for Analytical Cup Height Computation in Multi-stage Deep Drawing	533
<i>Holger Aretz</i>	
Computing Sheet Rolling Instabilities with a Shell Finite Element Model	541
<i>A. Cometa, H. J. M. Geijselaers, J. Havinga, and A. H. van den Boogaard</i>	
In-Plane Torsion Test - Analysis of the Tool Design	553
<i>Fabian Stiebert, Heinrich Traphöner, and A. Erman Tekkaya</i>	
Non-iterative Stress Projection Method for Rate-Independent Plasticity	562
<i>Seonyong Yoon, Shin-Yeong Lee, and Frédéric Barlat</i>	
Formability and Spring-Back of Light Metals at High Strain Rates	571
<i>Shi-Hong Zhang, Hao Li, Yong Xu, Shuai-Feng Chen, and Hong-Wu Song</i>	
A Material Model Optimization Approach for the Sheet Metal Forming Process Using the Hole Expansion Test	579
<i>Trunal Bhujangrao and Toni Chezan</i>	
Influence of the Identification Procedures of the Material Model in Accurate Prediction of Incremental Sheet Forming Forces	591
<i>Ehssen Betaieb, Jaekwang Shin, Youngrok Lee, Laurent Duchêne, Alan I. Taub, Mihaela Banu, and Anne Marie Habraken</i>	
Vibrating Tool Path Design for New Multi-axial Vibration Assisted Incremental Sheet Forming	603
<i>Zhidong Chang, Jamie Booth, and Hui Long</i>	

Anisotropic-Asymmetric Hardening Characterization of BCC/FCC/HCP Metals: Experiments and Modeling	613
Yanshan Lou, Chong Zhang, and Jeong Whan Yoon	
Highly Efficient Characterization of the Dynamic Anisotropic Plasticity for Sheet Metals from the Heterogeneous High-Speed Impact Inertial Fields via the Virtual Fields Method	622
Jiawei Fu, Zefei Yang, Yahui Cai, Jun Luo, and Lehua Qi	
Experimental Investigation on the Anisotropy of Wrought Magnesium Alloy by Complete Evolution of Equivalent Plastic Work Contours in “ α_{xx} - α_{yy} ” Space	630
Baodong Shi, Hui Zhao, and Jiaqing Jiang	
On the Numerical Assessment of Failure in Stretch-Flanging by SPIF Using Equivalent Strain Versus Triaxiality Diagrams	637
José Andrés López-Fernández, Gabriel Centeno, and Carpóforo Vallellano	
Texture and Microstructure After Roll-Bonding of an Fe-Al Multilaminate	646
Guillaume Hanon, Loïc Malet, and Laurent Delannay	
Thermal Ratcheting of Uranium Simulated with a Thermo-Elasto-Visco-Plastic Polycrystal Model	654
Carlos N. Tomé and Youngung Jeong	
Interpretation of the Unloading Non-linearity in Dual-Phase 980 Steel Using an Elasto-Visco-Plastic Self-consistent Polycrystal Model	662
Bohye Jeon and Youngung Jeong	
Modeling the Effect of Backstress on Springback Predictions in AA 6016-T4 as a Function of Pre-strain	671
Dane Sargeant, Md Zahidul Sarkar, Rishabh Sharma, Marko Knezevic, David Fullwood, and Michael Miles	
Honorary Symposium for Prof. Lang Li Hui	
Prof. Lihui Lang and His Contribution to Metal Forming Technology	685
Yong Li, Meng Zhang, Yi Xiao, Dongdong Yan, and Xiaoqiang Li	
A Study of Internal Defects in Flexible Medium Hydroforming of Complex Structures of Fiber Metal Laminates	691
Dongdong Yan, Yong Li, Chiye Zhang, Sanmin Zhang, and Lihui Lang	

Diffusion Bonding Process and Interface Performance of 2198 Al-Li Alloy	699
<i>Senbao Jiang, Zhiting Yang, Tianle Li, Zengyu Wang, Yue Yan, Yao Chen, and Xifeng Li</i>	
Enhanced Mechanical Properties of High Temperature Titanium Alloy Components by Fast Gas Forming with In-Die Quenching	707
<i>Wentao Chen, Kexin Dang, Kehuan Wang, and Gang Liu</i>	
Author Index	715

Proceedings of the 14th
International Conference on the
Technology of Plasticity

**Current Trends in the
Technology of Plasticity**

ICTP 2023

**Table of Contents of
Volume 3**

Contents

Volume 3

Joining

Friction-Induced Recycled Aluminium Semi-finished Products in Thermo-mechanical Joining Technology	3
<i>Thomas Borgert and Werner Homberg</i>	
Effect of Surface Oxidation Treatment Before Rolling on Properties of Cold Rolled Al/Steel Composite Plate	11
<i>Lun Fu, Chao Yu, and Hong Xiao</i>	
Joining of Metal Plates at Edges by High-Speed Sliding with Compression	19
<i>Minoru Yamashita, Aisuke Imayoshi, and Makoto Nikawa</i>	
Joint Strength Determination by a Resistance-Based Sensor in Metal-Polymer Joining by Hydraulic Expansion	27
<i>Florian Weber, Marlon Hahn, and A. Erman Tekkaya</i>	
Effect of Temperatures on Mechanical Properties and Microstructure Evolution of Laser-Welded Ni-Base Superalloy	35
<i>Ting Hou, Yuelin Wang, Degang Wang, and Yong Li</i>	
Experimental and Numerical Studies on the Roll Bonding of Manganese/stainless Steel for Press Hardening	43
<i>Mariá Mora Acuña, Zhao Liu, Aron Ringel, David Bailly, and Gerhard Hirt</i>	
Interface Characterization by Nanoindentation and EBSD of Cu/Cu and Al/Cu Joints Produced by Magnetic Pulse Welding (MPW)	53
<i>Benjamin Zielinski, Tarik Sadat, Rudy Dubois, José La Barbera, Cyrille Collin, Lola Lilenstein, Denis Jouaffre, Eric Markiewicz, and Laurent Dubar</i>	
Controlled Rivet Deformation During Self-piercing Riveting Through a Tailored Strength Distribution Within the Rivet Material	64
<i>Benedikt Uhe, Clara-Maria Kuball, Marion Merklein, and Gerson Meschut</i>	
Modeling and Parameterization for a 3D Simulation of Clinching with an Extensible Die	72
<i>M. Rossel and G. Meschut</i>	

An Injection Lap Riveting Tool System	81
<i>João P. M. Pragana, Rui F. V. Sampaio, Ivo M. F. Bragança, Carlos M. A. Silva, and Paulo A. F. Martins</i>	
Laser Surface Modification on Titanium Bipolar Plate of Hydrogen Fuel Cell to Enhance Bonding Performance	91
<i>Junying Min, Fangwei Lv, Hailang Wan, and Jianping Lin</i>	
Experimental and Numerical Investigation of Clinched Joints Under Shear Tensile Loading at High Strain Rates	103
<i>Max Böhnke, Christian R. Bielak, Mathias Bobbert, and Gerson Meschut</i>	
Axial Tube Sealing by Plastic Deformation via Rotary Swaging	114
<i>Thiemo Germann, David Löffler, Lea Becker, Philipp Heck, and Peter Groche</i>	
Optimization of Teeth Shape for Serration Joining	126
<i>Kazuhiko Kitamura, Kenji Hirota, Yoshihiko Ukai, and Ken-ichi Matsunaga</i>	
Numerical Investigation of the Coupled Friction Behavior in the Clinching Process Chain	138
<i>C. R. Bielak, M. Böhnke, M. Bobbert, and G. Meschut</i>	
Joint Design for Strut Connections in Airplane Structures Produced by Electromagnetic Forming	149
<i>Verena Psyk, Maik Linnemann, Marcel Henkel, Verena Kräusel, and Martin Dix</i>	
Numerical Investigation on Dissimilar Titanium-Aluminum T-joints Produced by Friction Stir Welding: Process Mechanics and Material Flow	157
<i>Harikrishna Rana, Gianluca Buffa, Fabrizio Micari, and Livan Fratini</i>	
Manufacturing of Shape Memory Alloy Pipe Coupler: Modeling and Application	169
<i>Xin Liu, Heng Li, Xinhao Wang, Yanhong Zhang, Jingchao Yang, Guangjun Li, and Xiangnan Men</i>	
Trade-off Analysis of Alternative Numerical Modelling Approaches for Distortion and Stress Field Prediction in Submerged Arc Welding Process	181
<i>Francesco Raffaele Battista, David Izquierdo Rodriguez, Francesco Gagliardi, Giuseppina Ambrogio, and Luigino Filice</i>	

Study of the Friction Forge Riveting (FFR) Process and Numerical Simulation	190
<i>Irène Tan, Alain Dadié, Guillaume Cohen, and Anna-Carla Araujo</i>	

Additive Manufacturing

Influence of Line Energy Density on the Ductility of Ti6Al4V L-PBF Parts for Hybrid Metal Forming Applications	203
<i>Gianluca Buffa, Dina Palmeri, Gaetano Pollara, and Livan Fratini</i>	
Hybrid Additive Manufacturing of Silver Collector Coins: An Experimental and Numerical Case Study	212
<i>João P. M. Pragana, Paulo Alexandrino, Rui F. V. Sampaio, Andreia Araujo, Ivo M. F. Bragança, Carlos M. A. Silva, and Paulo A. F. Martins</i>	
Temperature Effect in the Nickel-Superalloy Forming Process by Solid-State Bonding	221
<i>Yaping Wang, Yuehan Liu, and Jun Jiang</i>	

Study on Mechanical Properties of Hybrid Aluminum Alloy Formed by Rolling and Wire Arc Additive Manufacturing	229
<i>Zhongqi Yu, Xiaopeng Yu, Xinghan Chen, and Sule Feng</i>	

Design and Manufacturing of a Lightweight Press-Hardening Forming Tool by Wire Arc Additive Manufacturing	235
<i>Reyk Jäger, Benjamin Sydow, Alexander Schmidt, Susanne Witt, and Sebastian Härtel</i>	

Powder and Foam Processes

Semi-solid Die Casting of Some Aluminum Alloys for Lightweight Automotive Components	249
<i>Guochao Gu, Ruifen Li, Lixin Xiang, Hongliang Zheng, and Yupeng Lv</i>	
Fabrication of SiC Fiber-Reinforced Titanium Matrix Composite via Powder Hot Isostatic Pressing	258
<i>Yi Xiao, Yong Li, Huiqiao Du, and Lihui Lang</i>	
An Experimental Study of the Densification Mechanism in Semi-solid Powder Forming of Diamond/Al-Alloy Matrix Composite	266
<i>Wanpeng Zhang, Yong Li, Huiqiao Du, and Lihui Lang</i>	

Tribology/Surface Treatment

Review on Development and Testing of New Tribology Systems for Sheet Metal Forming	277
<i>Niels Bay, Esmeray Üstünyagiz, Mohd Hafis Sulaiman, Marcel Moghadam, and Chris V. Nielsen</i>	
Consideration of Pile-Up Material on Identification of Friction Coefficient in Aluminum Forming Processes at High Temperature	292
<i>Panuwat Soranansri, André Dubois, Philippe Moreau, and Laurent Dubar</i>	
Laser Implantation of Titanium-Based Particles into Hot Stamping Tools for Improving the Tribological Performance During Hot Sheet Metal Forming	301
<i>Stephan Schirdewahn, Niels Carstensen, Kai Hilgenberg, and Marion Merklein</i>	
Visualization of Shear Processing Condition by Die Vibration Monitoring	310
<i>Yuko Kitano, Satoru Goto, Junichi Takami, Yohei Suzuki, and Kota Abe</i>	
Development of Time and Area Dependent Forced Lubrication Technology in Hydroforming	318
<i>Hiroaki Kubota, Takuto Mikami, Yukiko Amano, Suguru Ishii, Tsubasa Miyazawa, and Kazunari Yoshida</i>	
Development of Multilayer Surface Coating on a Brass Foil	326
<i>Debjit Misra, Ankit Kumar Pandey, and Prashant P. Date</i>	
Improvement of Forging Tool Life by Hybrid Layers Combining Hardfacing and Nitriding Supported by Numerical Modelling of the Surface Layer	334
<i>Paweł Widomski, Zbigniew Gronostajski, Marcin Kaszuba, Marek Wilkus, Marcin Rychlik, and Jakub Krawczyk</i>	
Effect of Initial Surface Roughness on the Final Surface Properties of 1.2379 Tool Steel After Severe Shot Peening	344
<i>Mehmet Okan Görtan, Berkay Yüksel, and Alkim Adsız</i>	
Deep Rolling for Tailoring Residual Stresses of AA2024 Sheet Metals	352
<i>Jonas Lehmann, Sören Keller, Fabian Esterl, Nikolai Kashaev, Benjamin Klusemann, and Noomane Ben Khalifa</i>	

Experimental and Numerical Studies on Laser Quenching of 7CrSiMnMoV Steel	363
<i>Hongqiang Chu, Yubing Liu, Yuqi Li, Yanjin Guan, Jiqiang Zhai, and Jun Lin</i>	
Tools and Machines	
Towards the Real-Time Piloting of a Forging Process: Development of a Surrogate Model for a Multiple Blow Operation	377
<i>David Uribe, Camille Durand, Cyrille Baudouin, Pierre Krumpipe, and Régis Bigot</i>	
Knowledge-Based Die Design Method for Cold and Warm Forging Dies Shared in a Series of Forming Stages in Sequential Forging Press	389
<i>Masanobu Umeda, Yusuke Shibai, Yuji Mure, and Keiichi Katamine</i>	
Toward the Dissociation of Press and Tools in a Dynamic Model of a Forging Production System Including a Screw Press	402
<i>Heyu Song, Camille Durand, and Regis Bigot</i>	
Microstructure Evolution	
Size Effect on the Statistical Distribution of Stress and Strain in Microforming	413
<i>Z. Y. Feng, H. Li, D. Zhang, and M. W. Fu</i>	
Grain Structure Evolution Ahead of the Die During Friction Extrusion of AA2024	422
<i>Chang Yin-Cheng Chan, Uceu F. H. R. Suhuddin, Lars Rath, Felipe Labanca Bachiega, and Benjamin Klusemann</i>	
Experimental and Crystallographic Studies of Pyramidal <c+a> Slip in Magnesium	429
<i>Yan Huang and Jun Jiang</i>	
Intergranular Fracture Behaviour of ZK60 Magnesium Alloy Sheet by Combined CPFEM-CZM and In-Situ SEM Method	437
<i>Linghui Meng, Chunhui Wang, Xiaoxue Wang, Lipeng Zhang, Lingyun Qian, and Chaoyang Sun</i>	
Deformation, Damage and Fracture Behaviours of TWIP Steels Based on CZM-CPFEM at High Temperature	447
<i>Wang Cai, Chaoyang Sun, Hongjia Zhang, Chunhui Wang, and M. W. Fu</i>	

Influence of Equal-Channel Angular Pressing on the Microstructure and Texture of Mg-Zn-Y-Zr-RE Alloy Sheets	456
<i>Viktor Böhm, Maximilian Gruber, Elias Abele, Cordula Steinbauer, José Victoria-Hernández, Dietmar Letzig, Noomane Ben Khalifa, and Wolfram Volk</i>	
An Atomistic Investigation of the Strengthening Mechanism of Aluminum Matrix Composites Reinforced by Intergranular and Intragranular Carbon Nanotubes	467
<i>Yuan Gao, Xin Yan, and Yong Li</i>	
Anisotropic Size Effect on the Plastic Deformation Behavior of α -Ti	474
<i>Haidong Zhang, Lei Deng, Xinyun Wang, Xuefeng Tang, and Junsong Jin</i>	
Refinement Mechanism of Centimeter-Grade Coarse Grains in As-Cast Ti ₂ AlNb-Based Alloy Through Uniaxial and Multi-axial Compressions	482
<i>Haowei Liu, Zhongyuan Yang, and Zhenshan Cui</i>	
Improving the Precipitation Hardness of Ductile Magnesium Alloys by Twin Roll Casting	492
<i>Gerrit Kurz, Eneko Eizagirre Atxega, Fahrettin Özkaya, Jan Bohlen, Sven Hübner, Bernd-Arno Behrens, and Sumi Jo</i>	
Modelling Microstructure and Texture Evolution During Warm Rolling of Strip-Cast Non Grain Oriented Electrical Steel with 3.5wt% Si	500
<i>Tristan Bahs, Aditya Vuppala, Max Müller, Jannik Gerlach, David Bailly, and Gerhard Hirt</i>	
Full-Field Microstructure Modeling of a Nickel Based Superalloy During Industrial Forging Processes	509
<i>Chi-Toan Nguyen and Jean-Michel Franchet</i>	
Unsupervised Segmentation for Microstructure Identification of High Strength Steel with Superpixel Segmentation and Texture Feature Clustering	521
<i>K. Y. Shu, Z. X. Chen, B. Zhu, Y. L. Wang, and Y. S. Zhang</i>	
Comparison of Different Characterization Strategies for the Parametrization of Post-dynamic Recrystallization of Inconel 718 in a Full-Field Model	529
<i>Holger Brüggemann, Nadine Mostafa Talaat Elekyabi, Gerhard Hirt, and Pascal De Micheli</i>	

Correlation Among Stress State, Plastic Mechanism, and Texture Evolution for Magnesium Alloy Sheet: Analysis with Effective Schmid Factor	538
<i>Shuaifeng Chen, Siying Deng, Hongwu Song, and Shihong Zhang</i>	
A Study on Deformation Mechanisms of Ti ₂ AlNb-Based Alloy Under Plane Strain Compression	546
<i>Zhongyuan Yang, Haowei Liu, Haiming Zhang, and Zhenshan Cui</i>	
Modeling Zirconium Alloys Recrystallization by Full-Field and Mean-Field Approaches	554
<i>Victor Grand, Alexis Gaillac, and Marc Bernacki</i>	
Full Field Grain Size Prediction Considering Precipitates Evolution and Continuous Dynamic Recrystallization with DIGIMU® Solution	563
<i>Pascal De Micheli, K. Alvarado, V. Grand, and M. Bernacki</i>	
Implementation Improvement of a Lagrangian Method to Simulate Microstructure Evolution at the Mesoscopic Scale	575
<i>Elie Delplace, Sebastian Florez, Roman Gelly, and Marc Bernacki</i>	
Influence of Shell Material on the Microstructure and Mechanical Properties of Twin-Roll Cast Al-Si-Mg Alloy	589
<i>Olexandr Grydin, Moritz Neuser, and Mirko Schaper</i>	
Accelerated Phase-Field Simulations for Static and Dynamic Recrystallization	597
<i>Qi Zhang and Gang Fang</i>	
Microstructure Characterization of Ni-Based Superalloys During Thermal Exposure	605
<i>Zhaotian Wang, Hao Yu, Baoyun Zhang, and Yongquan Ning</i>	
From the Industrial Use of Digital Microstructures in the Context of Hot Metal Forming Processes: A Reality in Motion	611
<i>M. Bernacki, B. Flipon, N. Bozzolo, and Pascal De Micheli</i>	
Effect of Initial Orientation on Microstructural Evolution of Aluminum Single Crystals During Hot Deformation	623
<i>Y. Q. Chen, J. B. Xu, Z. M. He, S. P. Pan, W. H. Liu, and Y. F. Song</i>	
Effect of Ca or/and Sr on Microstructure Evolution and Mechanical Properties of Extruded Mg-2Zn Alloy	630
<i>Junlong Qin, Lili Chang, Xiaojing Su, and Guochao Gu</i>	

Effects of Grain Size on Deformation Inhomogeneity of Hot-Deformed AA7075	637
<i>B. Y. Su, N. Guo, B. T. Tang, W. X. Yang, G. Q. Liu, and Z. Liu</i>	
Influence of Stress State and Misorientation on Grain Deformation Coordination of Ferrite-Ferrite Bi-crystal	645
<i>Yongsheng Xu, Lingchao Xu, and Weigang Zhang</i>	
Effect of Multi-directional Forging Process on Microstructure and Properties of 20vol.% SiCw/6061Al Composites	652
<i>Guojing Yang, Xueze Jin, Wendeng Xiong, and Wenchen Xu</i>	
Prediction of Grain Size Uniformity in Hot Forming of TA15 Unequal Thickness Thin-Walled Shell	661
<i>Zhichao Sun and Zhenyu Dang</i>	
Hot Deformation Behavior of As-Cast Ti-6554 Alloy with Different Grain Morphologies	673
<i>Shiqi Guo, Liang Huang, Changmin Li, and Jianjun Li</i>	
Influence of Active Recovery and Initial Microstructures on Metadynamic Recrystallization of 5083 Aluminum Alloy	685
<i>Sheng Ding, Lihua Zhan, Minghui Huang, and Jun Yanagimoto</i>	
The Effects of Annealing on Microstructure and Mechanical Properties of Monolithic Low Carbon Steel and Medium Manganese Steel/low Carbon Steel (Mn8/SS400) Bimetal Composite	691
<i>Shengnan Yuan, Haibo Xie, Hui Wu, Mengyuan Ren, Xiaojun Liang, Sihai Jiao, and Zhengyi Jiang</i>	
Effect of Solution Temperature on the Microstructure Evolution and Tensile Properties of GH4175 Superalloy	703
<i>Zhigang Zhang, Jiao Luo, and Haokun Guo</i>	
Prediction of Microstructure for Inconel 718 Laser Welding Process Using Multi-scale Model	713
<i>Yukai Chen, Hongtu Xu, Yu Lu, Yin Wang, Shuangyuzhuo Wang, Ke Huang, and Qi Zhang</i>	
Miscellaneous	
Simplified 3D Finite Element Simulations of Manufacturing Process-Induced Distortions in Large Bearing Rings	725
<i>Ming He and R. Scott Hyde</i>	

Study on In-Situ Particle Strengthening Behavior of Intermetallic Compounds at Interface of Roll-Bonded Steel/aluminum Laminate <i>Zejun Deng, Hong Xiao, and Chao Yu</i>	740
Ultrasonic Vibration Influences on the Flow Stress Behavior of a Ferrite-Perlite and Austenite Stainless Steel <i>Markus Burmeister and Eberhard Kerscher</i>	751
Modeling of the Compaction Shot-Peening Process of an Al Multiparticulate Coating <i>Louise Eschard, Régis Kubler, Laurent Barrallier, Fanny Deloye, and Léa Gani</i>	759
Design Optimization and Validation of GMT Hat Structures <i>Saarvesh Jayakumar, Sharath Anand, and Xiangfan Fang</i>	768
The Effect of Electroplasticity on CNTs/Al Under Different Heat Treatment Tempers <i>Hongrui Dong, Guiqiang Guo, Yong Li, Xiaoqiang Li, Hongzhi Fan, Hegang Zhang, and Dongsheng Li</i>	777
Formability in Warm Deep Drawing of CFRTCP Using Tensile Test with Crossing Angle of Carbon Fiber as a Variable <i>Michihiko Hoshino, Naoya Takahashi, and Yoshinori Nagai</i>	784
Two-Step Homogenization of Elasto-Plastic Responses of Csf/Mg Composites <i>Wenlong Tian, Xujiang Chao, and Jiming Zhou</i>	793
Negative Pressure Forming of Double-Curved Reflector Panels with Honeycomb Sandwich Structure Based on Reconfigurable Discrete Mold <i>Mingming Wang, Yahui Qi, and Dongsheng Li</i>	800
Author Index	809

Proceedings of the 14th
International Conference on the
Technology of Plasticity

**Current Trends in the
Technology of Plasticity**

ICTP 2023

**Table of Contents of
Volume 4**

Contents

Volume 4

IA/Data Science

Machine Learning-Based Feature Evaluation for Scrap Float Detection with Accelerometers in Stamping	3
<i>Takahiro Ohashi</i>	
Prediction and Control of Microstructure Evolution of a Novel P/M Nickel-Based Superalloy During Near-Isothermal Forging	14
<i>Hongning Wen, Junsong Jin, and Xinyun Wang</i>	
Simulation-Based Data Augmentation for an Inline Wear State Detection During Blanking	23
<i>Christian Kubik, Daniel Michael Martin, Fabian Eberz, and Peter Groche</i>	
Data-Based Global Control of the Part's Geometry During Free-Form Bending	36
<i>Philipp Lechner, Lorenzo Scandola, Daniel Maier, Christoph Hartmann, and Mona Lieb</i>	
Deep Learning Enabled Tool Compensation for Addressing Shape Distortion in Sheet Metal Stamping	48
<i>H. R. Attar, L. Zhu, and N. Li</i>	
A Coupled Approach Based on Statistical Methods and Machine Learning Techniques to Improve Porthole Die Design	59
<i>Gabriele Zangara, Francesco Gagliardi, Luigino Filice, and Giuseppina Ambrogio</i>	
Deep Convolutional Neural Network to Assist Die Design for Flow Balance of Aluminum Hollow Extrusion	68
<i>Yan-Bo Yu, You-Rui Lai, Quang-Cherng Hsu, and Tat-Tai Truong</i>	

Blanking/Shearing

Galling-Free Fine Blanking of Titanium Gears Using Carbon-Supersaturated YXR7 Punch	81
<i>Tatsuhiko Aizawa and Kenji Fuchiwaki</i>	

Fine Piercing of Amorphous Electrical Steel Sheet Stack Using Micro-/Nano-Textured Punch	89
<i>Tomomi Shiratori, Yukiya Komori, Yohei Suzuki, Kohta Abe, and Tatsuhiko Aizawa</i>	
The Influence of the Stamping Parameters on the Warpage of Leadframe	100
<i>Heng-Sheng Lin, Wen-Hsiung Hsieh, Ian Hu, and Deng-Shun Zhang</i>	
New Modeling and Numerical Approach of the Temperature Evolution in a Carbide Insert in Milling Machining	109
<i>Adam Najem, Guillaume Altmeyer, and Arnaud Duchosal</i>	
Numerical Simulation and Experimental Verification of the Blanking Process of Medium-Thick Aluminum Alloy Plate	119
<i>Zhi-Chao Huang, Guo-Chao Guo, and Yu-Qiang Jiang</i>	

Investigation of the Influence of Cutting Speed on Component Quality for Ductile and High-Strength Materials Using a Novel Test Bench for High-Speed Impact Cutting	127
<i>Alexander Graf, André Leonhardt, Pascal Krutz, Matthias Rehm, and Martin Dix</i>	

Damage and Fracture

A Rate-Dependent Damage Mechanics Model on Plasticity and Ductile Fracture Prediction of Automotive Steel Sheets	139
<i>Chongyang Zeng, Max-Maria Bisch, and Xiangfan Fang</i>	
An Extended Ductile Fracture Prediction Model Considering Strain Rate Effects	151
<i>Zhe Jia, Lei Mu, Yang Liu, and Yong Zang</i>	
Investigation of the Damage Behavior of Steel/CF Hybrid by Pure Bending Test	160
<i>X. Hu, B. Zhu, C. Creighton, P. Zhang, R. Taube, and M. Weiss</i>	
A Methodology Using Cycle Jump Algorithm for Prediction of the Low Cycle Fatigue Life Concerning Mechanical Structures	171
<i>X. Liu, C. Labergere, and H. Badreddine</i>	
Evaluation of Crack Propagation During Cyclic Bending of Wire Strip	183
<i>Alina Biallas and Marion Merklein</i>	

On the Characterization of Fracture Forming Limits for Highly Ductile Metals Through Radial Extrusion	193
<i>Rui F. V. Sampaio, João P. M. Pragana, Ivo M. F. Bragança, Carlos M. A. Silva, and Paulo A. F. Martins</i>	
Thermal Control and Uncertainty Evaluation for Characterising Aluminium Formability Under Hot Stamping Conditions	203
<i>Jiaqi Li, Aldo Mendieta, Ruiqiang Zhang, Gavin Sutton, and Zhutao Shao</i>	
Damage Evolution in Axial Forming of External Splines and Quenching Operation of the Tubular Gear Shafts	215
<i>T. Rakshit, A. Dunlap, S. Kraemer, A. Schulze, A. Aretz, A. Schwedt, and A. E. Tekkaya</i>	
The Effect of Hardening Model on the Fracture of a Penetrator Impacting an Inclined Concrete Target	223
<i>Min Kuk Choi, Ju Suk Yang, Dong Ho Ha, Junyong Jang, Hanseong Jo, and Ki Lyuk Kim</i>	
Investigation of Damage-Controlling Process-Parameters During Cold Rolling on the Impact Toughness of DP800 Steel Under Crash Loading Stress States	232
<i>Niklas Fehlemann, Dorothea Czempas, Markus Könemann, David Lenz, Gerhard Hirt, and Sebastian Münstermann</i>	
Forming Analysis on the Effect of Ultra-Thinning of Sheet Metals Based on a Stress Rate Direction-Dependent Constitutive Model	243
<i>Tetsuo Oya, Koichi Ito, Gen Uemura, and Naomichi Mori</i>	
Simulative and Empirical Investigation of Test Specimen Geometries for the Determination of Forming Limit States in the Tensile-Compression Range for Austenitic Stainless Steel Foil Material	254
<i>Jan Sommer, Martina Müller, Tim Herrig, and Thomas Bergs</i>	
Controlling the Damage Evolution in Roll Forming of a V-Section by Elastomer Rollers	266
<i>Philipp Lennemann, Joshua Grodotzki, and A. Erman Tekkaya</i>	
Advancements in the Simulation of 3D Ductile Damage Transition to Fracture with FORGE®	275
<i>Alves José, Eldahshan Hazem, Ripert Ugo, Ducloux Richard, Muñoz Pino Daniel, and Bouchard Pierre-Olivier</i>	

Efficient Thermo-Mechanical Modelling of Cyclic Loading with Chaboche Type Constitutive Law Coupled with Damage	284
<i>Laurent Duchêne, Hélène Morsch, Carlos Rojas-Ulloa, Víctor Tuninetti, and Anne Marie Habraken</i>	
On the Assessment of the Forming Limit Diagram at Necking and Fracture for Polymer Sheets	295
<i>A. Rosa-Sainz, Gabriel Centeno, M. B. Silva, and C. Vallellano</i>	
Bending	
Effect of Initial Cross-Sectional Shape on Bent Shape in “Bending and Compression Method” for Forming In-Plane Bent Sheet Metal	307
<i>Tsuyoshi Muraoka, Yusuke Okude, Shohei Kajikawa, and Takashi Kuboki</i>	
Towards Control of Springback Variability in Novel Flexible Stretch Forming of Aluminium Extrusions	317
<i>Jun Ma, Sigmund A. Tronvoll, and Torgeir Welo</i>	
Cryogenic Forming Potential of Large Diameter and Thin-Walled Aluminum Alloy Tubular Materials	329
<i>Hong Sun, Heng Li, Heng Yang, Xuan Cheng Hao, Yang Liu, Ring Ming Cong, and Ming Wang Fu</i>	
Investigation of Warping and Springback in Kinematic U-Profile Bending with Partial Heating	340
<i>Eike Hoffmann, Joshua Grodotzki, and A. Erman Tekkaya</i>	
Stress Relief for Crack Prevention by Adding Holes to V-Bending Die	348
<i>Ryunosuke Yakuno, Hiroki Suwa, Kazuhito Takahashi, Shohei Kajikawa, Yasunori Yusa, and Takashi Kuboki</i>	
Refinement of Process Parameters in Rotary Draw Bending Processes	359
<i>Muhammad Ali Kaleem, Peter Frohn-Sörensen, Daniel Nebeling, and Bernd Engel</i>	
Mechanical Reaction of Granular Filler and Its Interaction Mechanism with Tube During Push-Bending Process	371
<i>Wenlong Xie, Shuaifeng Chen, Hongwu Song, and Shihong Zhang</i>	
Influence of Bending Radius and Heat-Affected Zones on the Bending Performance of High-Strength Thin-Walled Structures Formed by Laser-Assisted Robotic Roller Forming	382
<i>Yi Liu, Jincheng Wang, Wayne Cai, Junhe Lian, Blair E. Carlson, Zeran Hou, and Junying Min</i>	

Review and Analysis of Manufacturing Curved Extrusion Components	392
<i>Kuruppu A. D. D. Kuruppu, Wenbin Zhou, Zhusheng Shi, and Jianguo Lin</i>	
Effect of Diameter of Fulcrum Roller on Shape of Rebar in Bending	404
<i>Satoshi Higaki, Tomoki Go, Karen Mizuno, Masahiro Sasada, and Tatsuya Tanaka</i>	
Scalable Tool Design for 3D Swivel Bending	414
<i>Michael Schiller and Bernd Engel</i>	
Assessing the Bendability of Ultra-High Strength Steel in Plane Strain Conditions	426
<i>Phillip Krawec, Sumit Hazra, Ed Bramberly, Bin Xiao, and Didier Farrugia</i>	
Warm V-Bending and Hydrogen Embrittlement Properties of Ultrahigh-Strength TRIP-Aided Bainitic Ferrite Steel Sheets	436
<i>Akihiko Nagasaka, Tomohiko Hojo, Junya Kobayashi, and Chihaya Tabata</i>	
Constitutive Modeling	
Model-Based Evaluation of Methods for the Determination of the Onset of Yielding by Temperature Measurement	447
<i>Christoph Hartmann, Simon Vitzthum, Lorenz Maier, and Wolfram Volk</i>	
Study on the Micro-Scale Deformation Behavior of Al-B ₄ C Composite by Using CPFE-CZ Model	457
<i>Xu Tong, Y. Li, and M. W. Fu</i>	
Molecular Dynamics Simulation on the Initiation of Plastic Deformation by Nanoindentation	469
<i>Yuji Sato, Shuhei Shinzato, Takahito Ohmura, Takahiro Hatano, Jun Yanagimoto, and Shigenobu Ogata</i>	
A Microstructural Based Unified Model for Creep-Ageing Behaviour of Aluminium Alloy Under Various Thermal Conditions	480
<i>Yong Li, Tin Hou, Yuan Gao, and Dongsheng Li</i>	
Method for Determining the Flow Curve of Steel Considering Work Hardening Behavior	488
<i>Atsushi Suzuki, Kazuo Okamura, and Osamu Kada</i>	
Consistent Modeling of Thermo-Viscoplasticity for High-Speed Processes	498
<i>Patrice Longère</i>	

Physics-Based Constitutive Model of Bi-metallic Ring Blank by Centrifugal Casting Under Hot Deformation	509
<i>Yanlong Jia, Huiping Qi, Zhenjiang Li, Zhiqi Liu, Youwen Liang, Mengmeng Pei, and Fangcheng Qin</i>	
User-Defined Material Modelling of Woven Fabric Composites for Strain Rate Dependency and Nonlinear Shear Behaviors	521
<i>Bilal Ahmad, Saarvesh Jayakumar, and Xiangfan Fang</i>	
A Physical Constitutive Equation for Partial Remelting of AISI D2 Tool Steel in Consideration of Geometrical Morphology and Volume Fraction of Solid Particles in Semisolid Slurry	532
<i>Yi Meng, Jia-min Fang, and Sumio Sugiyama</i>	
Rate-Dependent Hardening Behavior and TRIP Effect in Quenching and Partitioning Steels for Application in Crash Energy-Absorbing Structures	544
<i>Max-Maria Bisch, Chongyang Zeng, Rongfei Juan, Junhe Lian, and Xiangfan Fang</i>	
3-D FE Forming Simulations Accounting for Texture Induced Anisotropy	556
<i>Benoit Revil-Baudard and Oana Cazacu</i>	
Stress-Free Determination of Yield Locus and Flow Curve Parameters by Partial Full-Field Measurements	566
<i>Celalettin Karadogan and Mathias Liewald</i>	
Parameter Identification Applying Full-Field Calibration (FFC) Techniques	578
<i>Christian Ilg, André Haufe, Vishal Sreenivasa, Celalettin Karadogan, and Mathias Liewald</i>	
Recovering and Hot Deformation Processing of Recycled Spray Formed 7055 Aluminum Alloy Powders	586
<i>Leigang Wang, Zhiwei Tao, Yao Huang, Mingxiao Shi, Kai Tang, and Xiang Ma</i>	
Dynamic Fracture Forming Limit Curve and Modelling of AA5182-O Aluminum Alloy Sheet	598
<i>Wei Liu, Jinjie Wu, Jili Liu, Zhenghua Meng, and Shangyu Huang</i>	
Mechanical Property Enhancement Due to Plastic Deformation Prior to Peak-Age Hardening in an Al-Mg-Si Aluminium Alloy	606
<i>Aniek van Essien, Zaidao Li, Carla Barbatti, Chamini Mendis, and Yan Huang</i>	

A More General Orthotropic Strain-Rate Potential Based on the Linear Transformation Method	616
<i>João P. Brito, Marta C. Oliveira, and José L. Alves</i>	
Effects of Tensile and Compressive Stresses on Stress Relaxation Behavior and Mechanical Properties in an Al-Cu Alloy	625
<i>Youliang Yang and Lihua Zhan</i>	
A Phenomenological Constitutive Model for the Tension-compression Asymmetry in Magnesium Alloys	632
<i>Kai Zhang, Houssem Badreddine, Zhenming Yue, Hong Yan, Shanling Han, and Huiping Li</i>	
A Full-Field Calibration Based on DIC for Parameter Identification of 3rd Gen AHSS	641
<i>Fei Han, Chenyang Xu, and Haomin Jiang</i>	
An Improved Physically-Based Constitutive Model for the Hot Deformation Behavior of GH4698 Superalloy by Considering Dynamic Softening Mechanism	651
<i>PeiZhi Yan, DongXu Wen, Liang Huang, XiaoLi Yang, ZhiCheng Zhang, and JianJun Li</i>	
The Role of the Yield Criterion on Stress and Strain Paths Under Non-proportional Loadings	663
<i>Mariem Nouira, Marta C. Oliveira, Ali Khalfallah, Diogo M. Neto, José L. Alves, and Luís F. Menezes</i>	
Unraveling the Effect of Microstructure on Edge Ductility of Dual-Phase Steels: A Computational Modelling Study	674
<i>Vahid Rezazadeh, Johan P. M. Hoefnagels, Marc G. D. Geers, and Ron H. J. Peerlings</i>	

Experimental Characterisation

Inverse Identification of a 3D Anisotropic Yield Function Through an Information-Rich Tensile Test and Multi-sDIC	689
<i>S. Coppieters, Y. Zhang, N. Vancraeynest, A. Lambrughi, and S. Cooreman</i>	
Deformation Behavior of X70 Pipeline Steel Under Hot Straightening Condition	700
<i>Zhanyuan Xue, Ben Guan, and Yong Zang</i>	

Increasing the Occurring Normal Stresses in Conical Tube-Upsetting Test Using Adapted Specimen Geometries	711
<i>Michel Henze, David Bailly, and Gerhard Hirt</i>	
Improvement of a Testing Method of Cold Forging Performance of Steel Wires	719
<i>Tomoyuki Hakoyama, Koki Kato, Kazumasa Aoyama, Nobuhiko Ibaraki, and Zhigang Wang</i>	
Rapid Heating Process of High Strength Steel Zinc-Iron Coated Plate and Its Effect on Deformation Characteristic	728
<i>Yilin Wang, Dongyu Fang, Liang Wang, and Yisheng Zhang</i>	
Comparison of Several Methods for Measuring Elasticity Coefficients	736
<i>Xavier Lemoine and Frédéric Bonnet</i>	
Effect of ECAP Process on the Activation of Deformation Mechanisms During Subsequent Uniaxial Tension of Mg-ZEWK2000 Sheets	744
<i>José Victoria-Hernandez, Guadalupe Cano-Castillo, Viktor Böhm, Maximilian Gruber, Wolfram Volk, Noomane Ben Khalifa, and Dietmar Letzig</i>	
In-plane Torsion Tests, Toward Large Strains Under Monotonic and Cyclic Loading of Sheet Metals	754
<i>Xavier Colon, Vincent Grolleau, Bertrand Galpin, Christian C. Roth, and Dirk Mohr</i>	
Interface Evolution and Mechanical Properties of the Solid State Recycled Mg-Gd-Y-Zn-Zr Alloy During Rotary Extrusion	764
<i>Bugang Teng, Yanbo Pei, Ji Wu, and Bing Li</i>	
High-Temperature Tensile Testing of Metal Tubes with Small Diameters by Resistance Heating Method	772
<i>Qiu Zheng and Tsuyoshi Furushima</i>	
Author Index	781