

Table of Contents

Committees and Acknowledgements

Keynotes

Friction Based Solid State Welding Processes

L. Fratini, G. Buffa and D. la Spisa

3

Formability of Metallic Materials

Determination of Forming Limit Strains Using Marciniak-Kuczynski Tests and Automated Digital Image Correlation Procedures

D. Vysochinskiy, T. Coudert, A. Reyes and O.G. Lademo

17

Analysis of the Anisotropic Behavior and of the Formability Aptitude for an AA2024 Alloy Using the Channel Die Compression Test and the Simple Tension Test

S.Y. Zhang, H. Francillette and A. Gavras

23

On the Improvement of Formability and the Prediction of Forming Limit Diagrams at Fracture by Means of Constitutive Modelling

Y. Kiliclar, M. Engelhardt, I.N. Vladimirov, M.P. Pietryga, H. von Senden genannt Haverkamp, S. Reese and F.W. Bach

29

Plastic Instability Based on Bifurcation Analysis: Effect of Hardening and Gurson Damage Parameters on Strain Localization

L.Z. Mansouri, H. Chalal, F. Abed-Meraim and T. Balan

35

Modelling of Strain Hardening Behaviour of Sheet Metals for Stochastic Simulations

F. Quetting, P. Hora and K. Roll

41

Identification of Process-Based Limit Stress States Applying a Stretch-Bending-Test

C. Hezler, M. Merklein, J. Hecht and B. Griesbach

47

Determination of Flow Curves under Equibiaxial Stress Conditions

J. Mulder, H. Vegter, J.J. Ha and T. van den Boogaard

53

Biaxial Tensile Test of High Strength Steel Sheet for Large Plastic Strain Range

T. Hakoyama and T. Kuwabara

59

Using Cross Stamping to Test Zinc Sheets Formability

Y. Jansen, R.E. Logé, M. Milesi, S. Manov and E. Massoni

65

Influence of Different Pre-Stretching Modes on the Forming Limit Diagram of AA6014

A. Werber, M. Liewald, W. Nester, M. Grünbaum, K. Wiegand, J. Simon, J. Timm, C. Bassi and W. Hotz

71

Effect of the Constitutive Law on the Accuracy of Prediction of the Forming Limit Curves

L. Paraianu, D.S. Comsa, I.P. Nicodim, I. Ciobanu and D. Banabic

77

Evolution of Roughness on Straining of Interstitial Free – IF Steel Sheet

R.K. Unfer and J.D. Bressan

83

Anisotropic Plastic Behavior of TRIP 780 Steel Sheet in Hole Expansion Test

S. Panich, V. Uthaisangsuk, S. Suranuntchai and S. Jirathearanat

89

Study of True Stress-Strain Curve after Necking for Application in Ductile Fracture Criteria in Tube Hydroforming of Aerospace Material

M. Saboori, H. Champiaud, J. Ghoulipor, A. Gakwaya, J. Savoie and P. Wanjara

95

Failure Prediction in Sheet Metal Forming Depending in Pre-Straining and Bending Superposition

R. Denninger, M. Liewald and M. Sindel

101

A Procedure for the Evaluation of Flow Stress of Sheet Metal by Hydraulic Bulge Test Using Elliptical Dies

L. Lazarescu, I.P. Nicodim, D.S. Comsa and D. Banabic

107

Methodology to Produce Locally Heat-Treated EN AW-5182 Aluminum Alloy Sheet Metal Parts

A.M. Sulzberger, M. Merklein, W. Staufner and D. Wortberg

113

Laser Beam Structured Sheets – A New Potential for Sheet Metal Forming R. Neugebauer and M. Ahnert	119
Elasto-Plastic Models with Continuously Distributed Dislocations and Disclinations S. Cleja-Tigoiu	125
Failure Evaluation of Spot Welds for Advanced High Strength Steel Sheets W. Noh, D.H. Yoo, Y.W. Koh, K.S. Chung and X. Yang	131
Processing of New Solar Absorbers in Steel Design Based on Partially Cold Roll Bonded Hybrid Semi-Finished Parts F. Steinbach, L. Koch, M. Hermann, J. Witulski and A.E. Tekkaya	137
Increase the Deformability of NiCo Single Crystals Using of Electrical Pulse-Like Currents G. Gerstein, M. Nowak, M.S. Bierbaum, T. Zhuravina, M. Schaper and F.W. Bach	143

Forging and Rolling

EcoForge: Resource-Efficient Process Chains for High Performance Parts B.A. Behrens, W. Bleck, F.W. Bach, E. Brinksmeier, U. Fritsching, M. Liewald and H.W. Zoch	151
Computer Aided Design of Manufacturing of Fasteners - Selection of the Best Production Chain M. Skóra, S. Weglarczyk, J. Kusiak and M. Pietrzyk	157
Numerical and Experimental Investigations on the Service Life Estimation for Hot-Forging Dies B.A. Behrens, A. Bouguecha, T. Hadifi and A. Klassen	163
Microstructural Behaviour in Rotary Forging of Inconel 718 Á. Mangas, M. Santos, J. San José, G. Atxaga and O. Adarraga	169
Compound Forging of Hybrid Powder-Solid-Parts Made of Steel and Aluminum B.A. Behrens, K.G. Kosch, C. Frischkorn, N. Vahed and A. Huskic	175
Hydroforging of Thick-Walled Hollow Aluminum Profiles K. Müller, M. Stonis, M. Lücke and B.A. Behrens	181
Evolution of Microstructure during the Shape Rolling Modeled by Cellular Automata Ł. Łach and D.S. Svyetlichnyy	187
Coupled Thermo-Mechanical Analysis of Process-Integrated Powder Coating by Means of Hot Rolling R. Kebriaei, J. Frischkorn, S. Reese, H. Moll, W. Theisen, T. Husmann and H. Meier	193
Scale Behaviour and Deformation Properties of Oxide Scale during Hot Rolling of Steel M. Graf and R. Kawalla	199
Cross Wedge Rolling of Preforms for Crankshafts M. Meyer, M. Stonis and B.A. Behrens	205

Composites Forming Processes

A Simple Discrete Method for the Simulation of the Preforming of Woven Fabric Reinforcement W. Najjar, X. Legrand, C. Pupin, P. Dal Santo and S. Boude	213
Analysis of Non-Crimp Fabric Composite Reinforcements Forming S. Bel, N. Hamila and P. Boisse	219
Characterization and Finite Element Modeling of Unidirectional Non-Crimp Fabric for Composite Manufacturing A. Petrov, J.A. Sherwood and K.A. Fetfatsidis	225
Complex Shape Forming of Flax Based Woven Fabrics - Analysis of the Yarn Tensile Strain during the Process P. Ouagne, D. Soulat, C. Tephany, J. Moothoo, S. Allaoui, G. Hivet and D. Duriatti	231
Forming of Thermoplastic Composites S.P. Haanappel, U. Sachs, R.H.W. ten Thije, B. Rietman and R. Akkerman	237
Intraply Shearing Characterization of Thermoplastic Composite Materials in Thermoforming Processes P. Wang, N. Hamila and P. Boisse	243

Simulating the Manufacturing Process and Subsequent Structural Stiffness of Composite Wind Turbine Blades with and without Defects	
K.A. Fetfatsidis, C. Mitchell, J.A. Sherwood, E. Harvey and P. Avitabile	249
Tow-Scale Mechanics for Composite Forming Simulations	
P. Potluri, R. Ramgulam, M. Chilo and H. Arshad	255
3D Interlock Composite Preforming Simulation	
J.G. Orliac, A. Charmetant, F. Morestin, P. Boisse and S. Otin	261
3D Hyperelastic Constitutive Model for Yarn Behaviour Description	
A. Charmetant, E. Vidal-Sallé and P. Boisse	267
Compression Behaviour of Steel Fibre Knitted Fabrics	
F. Hanot, K. Vanclooster and S. Lomov	273
Experimental Characterization and Modeling of Bending Properties of Woven Fibrous Preforms	
E. Syerko, S. Comas-Cardona and C. Binetruy	277
First Steps on the Modeling and Simulation of Thermoplastic/Thermoset Phase Separation	
H. Lamari, A. Ammar, A. Leygue and F. Chinesta	283
Flow Monitoring and Permeability Measurements in LCM Processes by the Means of a Dielectric Sensor	
P. Carlone and G.S. Palazzo	289
Manufacturing Processes for Combined Forming of Multi-Material Structures Consisting of Sheet Metal and Local CFRP Reinforcements	
H.C. Schmidt, U. Damerow, C. Lauter, B. Gorny, F. Hankeln, W. Homberg, T. Troester, H.J. Maier and R. Mahnken	295
Forming Simulation Sensitivity Study of the Double-Dome Benchmark Geometry	
B. Rietman, S.P. Haanappel, R.H.W. ten Thijs and R. Akkerman	301
A Friction-Test Benchmark with Twintex PP	
U. Sachs, K.A. Fetfatsidis, J. Schumacher, G. Ziegmann, S. Allaoui, G. Hivet, E. Vidal-Sallé and R. Akkerman	307
Analyze of the Contact Behaviour between Two Layers of Dry Glass Plain Weave Fabric	
S. Allaoui, G. Hivet and P. Ouagne	313
Friction Measurement on Dry Fabric for Forming Simulation of Composite Reinforcement	
E. Vidal-Sallé and F. Massi	319
Tow Mechanics: A Contact Mechanics Approach of Friction in Fibrous Tows during Forming	
B. Cornelissen, B. Rietman, M. de Rooij and R. Akkerman	325

Semi-Solid Processes

The Influence of Particle Size on Viscosity in Thixo Material	
S. Harboe and M. Modigell	333
Production of Aluminium Matrix Nanocomposite Feedstock for Thixoforming by an Ultrasonic Method	
S. Kandemir, A. Yalamanchili and H.V. Atkinson	339
Effect of Experimental Conditions on 7075 Aluminium Response during Thixoextrusion	
A. Neag, V. Favier, M. Pop, E. Becker and R. Bigot	345
Thermal Simulation of Laser Surface Modification of H13 Die Steel	
S.A. Syarifah Nur Aqida, S. Naher and D. Brabazon	351
Thixo Lateral Forging of a Commercial Automotive Spindle from LTT45 Steel Grade	
J. Lozares, Z. Azpilgain, I. Hurtado, R. Ortubay and S. Berrocal	357
Considerations on the Reliability of Advanced Squeeze Casting Process	
M. Rosso and I. Peter	361

Light Weight Design and Energy Efficiency in Metal Forming

Lightweight Construction by Means of Profiles	
S. Chatti, D. Pietzka, N. Ben Khalifa, A. Jäger, A. Selvaggio and A.E. Tekkaya	369

Tailored Heat Treated Profiles - Enhancement of the Forming Limit of Aluminum Profiles under Bending Load	
M. Merklein, M. Lechner, T. Schneider and R. Plettke	375
Cold Backward Extrusion of Titanium Billet with Pulsating Lubricant Supply on Servo Press	
R. Matsumoto, S. Sawa and H. Utsunomiya	381
Influence of Processing Parameters on Bonding Conditions in Backward Extrusion Forged Bonding	
Y. Yoshida, T. Matsubara, K. Yasui, T. Ishikawa and T. Suganuma	387
Analytic Prediction of the Process Parameters for Form-Fit Joining by Die-Less Hydroforming	
S. Gies, C. Weddeling, M. Marré, L. Kwiatkowski and A.E. Tekkaya	393
Analytical and Numerical Approaches to Predict the Flow Characteristics of a Magnetorheological Fluid in Rotational Symmetric Cross Sections	
S. Rösel, M. Merklein and M. Grüner	399
Observation of Welded Interface of SPCC/A1100-O Tailored Blanks Made by Butt Laser Welding	
T. Iizuka and R. Itani	405

New and Advanced Numerical Strategies for Material Forming

2D Meshless Solution of Elastoplastic with Damage Problem	
Z. Sendi, C. Labergère, K. Saanouni and H.B. Salah	413
Analysis of Plastic Flow during Friction Stir Spot Welding Using Finite Element Modelling	
Z. Gao, F. Krumphals, P. Sherstnev, N. Enzinger, J.T. Niu and C. Sommitsch	419
Explicit Simulation of Forming Processes Using a Novel Solid-Shell Concept Based on Reduced Integration	
M. Pagani, S. Reese and U. Perego	425
Free Surface Modeling of Contacting Solid Metal Flows Employing the ALE Formulation	
A.A. van der Stelt, T.C. Bor, B. Geijselaers, R. Akkerman and J. Huétink	431
Improvement on CAE Model for Accurate Torsional Springback Prediction in High Strength Steel Part Forming	
A. Ishiwatari, H. Kano, J. Hiramoto and T. Inazumi	437
Modeling Induced Flow Anisotropy and Phase Transformations in Air Hardening Steels	
C. Barthel, B. Klusemann, R. Denzer, T. Clausmeyer and B. Svendsen	443
Numerical Modelling and Experimental Study of Sandwich Shells with Metal Foam Cores	
H. Mata, R. Natal Jorge, A.D. Santos, M.P.L. Parente, R.A.F. Valente and A.A. Fernandes	449
Remapping Method for Transferring Data between Two Meshes Using a Modified Iterative SPR Approach for Parallel Resolution	
S. Kumar and L. Fourment	455
A First Approach Toward a Proper Generalized Decomposition Based Time Parallelization	
F. Poulhaon, F. Chinesta and A. Leygue	461
Real Time Simulation of Non-Linear Solids by PGD Techniques	
S. Niroomandi, D. Gonzalez, I. Alfaro, F. Bordeu, A. Leygue, E. Cueto and F. Chinesta	467

Extrusion and Drawing

An Investigation of the Material Flow in a Screw Extruder of Aluminium Using Contrast Material	
F. Widerøe and T. Welo	475
Manufacturing of Steel-Reinforced Aluminum Products by Combining Hot Extrusion and Closed-Die Forging	
A. Foydl, I. Pfeiffer, M. Kammler, D. Pietzka, T. Matthias, A. Jäger, A.E. Tekkaya and B.A. Behrens	481
Effect of Process Parameters on Seam Weld Quality of ZM21 Tubes	
A. Segatori, B. Reggiani, L. Donati, T. Pinter, Y. Rami and L. Tomesani	487
Metal Flow in Two-Hole Extrusion of Al-Alloys Studied by FEA with Experiments	
J. Kandis and H. Valberg	493

Constitutive Equations for Finite Element Simulation C. Bruni and M. El Mehtedi	499
The Model for Coupled Simulation of Thin Profile Extrusion N. Biba, S. Stebunov and A. Lishny	505
Comparison between FEM Simulations and Analytical Calculations of Required Force for Al Extrusion S. Torabzadeh Khorasani and H. Valberg	511
Numerical Approach for the Evaluation of Seam Welding Criteria in Extrusion Processes M. Schwane, T. Kloppenborg, A. Reeb, N. Ben Khalifa, A. Brosius, K.A. Weidenmann and A.E. Tekkaya	517
Effect of Porthole Design and Welding Chamber Dimensions on Material Flow and Weld Deformability of Extruded Aluminium Profiles L. Donati, N. Ben Khalifa, L. Tomesani and A.E. Tekkaya	523
On the Fundamental Mechanism of Seam Welding in Extrusion of Aluminum Alloys H. Valberg and Y.A. Khan	529

Friction and Wear in Material Processing

Frictional Behaviour of Environmentally Friendly Lubricants for Sheet Metal Forming Processes F. Sgarabotto and A. Ghiotti	537
Tribological Behaviour of PVD Coatings for Sheet Metal Forming Tools: Laboratory and Industrial Evaluation F. Sgarabotto and A. Ghiotti	543
Velocity Gradients and the Evolution of Material Properties in a Narrow Layer near Surfaces of High Friction in Metal Forming Processes S. Alexandrov and Y.R. Jeng	549
Sliding Wear Behaviour of Al-7075 Based Metal Matrix Composite: Effect of Processing Parameters R. Dasgupta, S. Das and A.K. Jha	555
Tribological Performances of Two White Lubricants in Hot Steel Forging A. Dubois, M. Dubar, L. Dubar and B. Tlili	561

Nano-Structured Materials and Microforming

New SPD Process of Incremental Angular Splitting A. Rosochowski, M. Rosochowska and L. Olejnik	569
Formability of Ultrafine-Grained AA6016 Sheets Processed by Accumulative Roll Bonding T. Hausöl, C.W. Schmidt, V. Maier, W. Böhm, H. Nguyen, M. Merklein, H.W. Höppel and M. Göken	575
Benchmarking of Direct and Indirect Friction Tests in Micro Forming R.S. Eriksen, M. Calaon, M. Arentoft and N. Bay	581
Experimental Study of a Full Forward Extrusion Process from Metal Strip M. Merklein, T. Stellin and U. Engel	587
Influence of Punch Velocity on Spring Back in Micro Forming H. Wielage, Z.Y. Hu and F. Vollertsen	593
Dynamic Characteristics of a Micro-Sheet-Forming Machine System Y. Qin, A.R. Razali, M. Zhou, J. Zhao, C. Harrison and W.A. Wan Nawang	599

Inverse Analysis Optimization and Stochastic Approaches

A Comparison between Three Meta-Modeling Optimization Approaches to Design a Tube Hydroforming Process G. Ingarao, L. Marretta and R. Di Lorenzo	607
Optimization of Forging Preforms by Using Pseudo Inverse Approach A. Halouani, Y.M. Li, B. Abbès, Y.Q. Guo, F.J. Meng, C. Labergère and P. Lafon	613

Towards Inverse Form Finding Methods for a Deep Drawing Steel DC04 S. Germain and P. Steinmann	619
Optimization of Pre-Stressed Press Frames M. Strano, M. Monno and A. Rossi	625
Statistical Analysis of Forming Processes as a First Step in a Process-Chain Analysis: Novel PRO-CHAIN Components D. Steffes-Lai and T. Clees	631
Cazacu and Barlat Criterion Identification Using the Cylindrical Cup Deep Drawing Test and the Coupled Artificial Neural Networks – Genetic Algorithm Method H. Aguir, J.L. Alves, M.C. Oliveira, L.F. Menezes and H. BelHadjSalah	637
AZ31 Magnesium Alloy Parameters Identification through Inverse Analysis at 713 K G. Giuliano	643

Constitutive Models for Metallic Alloys (Multiscale & Continuum)

Prediction of Texture Evolution in Rolled Sheet Metals by Using Homogenization Schemes K. Jöchen and T. Böhlke	649
Texture Based Finite Element Simulation of a Two-Step Can Forming Process V. Glavas, T. Böhlke, D. Daniel and C. Leppin	655
Evaluation of Associated and Non-Associated Flow Metal Plasticity; Application for DC06 Deep Drawing Steel M. Safaei, W. De Waele and S.L. Zang	661
Unconditionally Convex Yield Functions for Sheet Metal Forming Based on Linear Stress Deviator Transformation H. Aretz and F. Barlat	667
Compartmentalized Model for the Mechanical Behavior of Titanium L. Tabourot, P. Baland, J. Raujol-Veillé, M. Vautrot, C. Déprés and F. Toussaint	673
On the Modeling of Evolving Elastic and Plastic Anisotropy in the Finite Strain Regime – Application to Deep Drawing Processes I.N. Vladimirov, M.P. Pietryga, V. Tini and S. Reese	679
Assessment of Distinct Algorithmic Strategies in the Implementation of Complex Anisotropic Yield Criteria T.J. Grilo, R.A.F. Valente and R.J.A. de Sousa	685
Implementation and Validation of a Gurson Damage Model Modified for Shear Loading: Effect of Void Growth Rate and Mesh Size on the Predicted Behavior M. Achouri, G. Germain, P. dal Santo and D. Saidane	691
Constitutive Equation for Description of Metallic Materials Behavior during Static and Dynamic Loadings Taking into Account Important Gradients of Plastic Deformation A. Gavrus	697
Identification of the Plastic Behaviour in the Post-Necking Regime Using a Three Dimensional Reconstruction Technique M. Rossi and P. Fabrice	703

Innovative Joining by Forming Technologies

Laser Heat Treatment Effects on Roller Hemming in Aluminum Alloys T. Kleeh, M. Merklein and K. Roll	711
Superplastic Forming/Diffusion Bonding of a Titanium Alloy for the Realization of an Aircraft Structural Component in Multi-Sheets Configuration L. Carrino, V. Paradiso, S. Franchitti, A. Squillace and S. Russo	717
Smart Components through Rotary Swaging M. Brenneis and P. Groche	723
Study of Wavy Interface in Electromagnetic Welds S.D. Kore, P.N. Vinod, S. Kumar and M.R. Kulkarni	729
Process Mechanics in Friction Stir Welding of Magnesium Alloys: Experimental and Numerical Analysis G. Buffa, L. Fratini, T. Gnihl, M. Wieland and M. Merklein	735

Investigation of Vibration Assisted Friction Stir Welding H. Montazerolghaem, M. Badrossamay and A. Fadaei Tehrani	741
Experimental and Numerical Analysis on FSWed Magnesium Alloy Thin Sheets Obtained Using “Pin” and “Pinless” Tool G. Buffa, A. Forcellese, L. Fratini and M. Simoncini	747
Experimental Analysis of the Influence of Process Parameters on Residual Stress in AA2024-T3 Friction Stir Welds P. Carlone and G.S. Palazzo	753
Quality Analysis of Friction Stir Welded Butt Joints by Means of Experiments and Simulations G. D'Urso, M. Longo, C. Giardini and E. Ceretti	759
Extension of a Failure Criterion for Hemming Applications in the FEM Simulation M. Zubeil, K. Roll and M. Merklein	765
Numerical and Experimental Studies on the Clinch-Bonding and Riv-Bonding Process R. Neugebauer, M. Israel, B. Mayer and H. Fricke	771
Simulation of Hybrid Joining Technologies Using the Example of Clinch-Bonding S. Etemadi, O. Hahn and K. Roll	777
A New Clinching Process Especially for Thin Metal Sheets and Foils B.A. Behrens, A. Bouguecha, C.P. Eckold and I. Peshekhodov	783

Incremental and Sheet Metal Forming

Investigation of Thick Sheet AHSS Springback in Combined Bending under Tension H. Chalal, S.G. Racz and T. Balan	791
Comparison of Bending of Automotive Steels in Roll Forming and in a V-Die M. Weiss, J. Marnette, P. Wolfram, J. Larrañaga and P.D. Hodgson	797
Bending Testing Rig Development through CAE Tools Application A. Del Prete, G. Papadia and T. Primo	803
An Analytical Method for Prediction of Cross-Sectional Deformations in Stretch Bending T. Welo	809
Warm Incremental Forming of Magnesium Alloys Using Hot Fluid as Heating Media L. Galdos, E. Sáenz de Argandoña, I. Ulacia and G. Arruebarrena	815
Towards Energy Efficiency in Incremental Forming of Titanium G. Ambrogio, F. Gagliardi, L. Filice and O. Aghinelli	821
In-Process Hardening in Laser Supported Incremental Sheet Metal Forming A. Mohammadi, H. Vanhove, A.K. Behera, A. van Bael and J.R. Duflou	827
An Upper-Bound Prediction of Tangential Force in Single Point Incremental Forming M.J. Mirnia and B. Mollaei Dariani	833
Flexible Tooling System Using Reconfigurable Multi-Point Thermoforming Technology for Manufacturing Freeform Panels S.Z. Su, M.Z. Li, C.G. Liu, C.Q. Ji, R. Setchi, J. Larkiola, I. Panteleev, I. Stead and R. Lopez	839
Viscoplastic Regularization of Local Damage Models: A Latent Solution M.S. Niazi, H.H. Wisselink and V.T. Meinders	845
Any Effect of Processing History on Precipitation Hardening of Metastable Austenitic Stainless Steels S. Saha, K. Datta, M.K. Mitra, L.E. Lindgren and J. Post	851
Optimizing Roll Forming Processes with the Aid of a New Numerical Algorithm A. Abrass, T. Kessler and P. Groche	857
Preliminary Studies on the Determination of FLD for Single Point Incremental Sheet Metal Forming M. Tisza, P.Z. Kovács and Z. Lukács	863
An Integrated Approach to Accurate Part Manufacture in Single Point Incremental Forming Using Feature Based Graph Topology A.K. Behera, B. Lauwers and J.R. Duflou	869
Integrated Process Design for Two Robots Based Incremental Sheet Metal Forming D. Kreimeier, J.H. Zhu and R. Laurischkat	877
FlexDie: A Flexible Tooling-Concept for Incremental Sheet Forming G. Sebastiani, A. Wawrosch, V. Franzen, A. Brosius and A.E. Tekkaya	883

Ludwik's Model Parameter Identification for V-Bending Simulations with Ti64 and MS1200	
J. Mendiguren, L. Galdos, E. Sáenz de Argandoña and E. Silvestre	889
Methodology for the Analysis of the Process Behaviour of Advanced High Strength Steels in Bending and Shearing Operations	
I. Tsoupi, S. Hildering and M. Merklein	895
Influence of Predetermined Surface Defect to the Bendability of Ultra-High-Strength Steel	
A. Määttä, A. Järvenpää, M. Jaskari, K. Mäntyjärvi and J.A. Karjalainen	901
A Self-Correcting Approach for the Bending of Metal Parts	
U. Damerow, M. Borzykh, W. Homberg and A. Trächtler	907
Evaluation of the Enhanced Assumed Strain and Assumed Natural Strain in the SSH3D and RESS3 Solid Shell Elements for Single Point Incremental Forming Simulation	
C.F. Guzmán, A. Ben Bettaieb, J.I.V. de Sena, R.J.A. de Sousa, A.M. Habraken and L. Duchêne	913
Influence of Material Properties on Accuracy Response Surfaces in Single Point Incremental Forming	
A.K. Behera, J. Gu, B. Lauwers and J.R. Dufloy	919
A New Tool Concept for Rotary Peen Forming with Defined Impact Positions	
C. Russig, M. Bambach and G. Hirt	925
Incremental Forming of Sandwich Materials	
L. Galdos, E. Sáenz de Argandoña, N. Otegi and R. Ortubay	931
Punch Radius Influence on "Large Size" Hydroformed Components	
G. Papadia, A. Del Prete and A. Spagnolo	937
Experimental and Numerical Investigation on the Formability of Clad Sheets Copper/Stainless Steel 304L in Spinning Process	
A. Rezaei Shahreza, F. Dehghani and M. Salimi	943
Development of Boss Forming Simulation Technologies with a Rotary Tool	
Y. Kobayashi, S. Takahashi, E. Yukutake and S. Negishi	949
Warm Deep Drawability of Peak-Aged 7075 Aluminium Sheet Alloy	
N. Sotirov, P. Simon, C. Chimani, D. Uffelman and C. Melzer	955

Sheet-Bulk-Metal Forming

Acquisition of Heuristic Knowledge for the Prediction of the Frictional Behavior of Surface Structures Created by Self-Excited Tool Vibrations	
T. Breitsprecher, R. Hense, F. Hauer, S. Wartzack, D. Biermann and K. Willner	963
Amorphous Carbon Coatings for Locally Adjusted Tribological Properties in Sheet Bulk Metal Forming	
H. Hetzner, S. Tremmel and S. Wartzack	969
Improved Tool Surfaces for Incremental Bulk Forming Processes of Sheet Metals	
P. Sieczkarek, L. Kwiatkowski, A.E. Tekkaya, E. Krebs, D. Biermann, W. Tillmann and J. Herper	975
The Load-Scanning Test – Evaluation of a Universal Tribological Model Test in View of Sheet Bulk Metal Forming	
H. Hetzner, S. Tremmel and S. Wartzack	981
Goal Oriented Error Control for Frictional Contact Problems in Metal Forming	
H. Blum, A. Rademacher and A. Schröder	987
Material Model Identification for DC04 Based on the Numerical Modelling of the Polycrystalline Microstructure and Experimental Data	
E. Lehmann, S. Schmaltz, S. Germain, D. Faßmann, C. Weber, S. Löhnert, M. Schaper, F.W. Bach, P. Steinmann, K. Willner and P. Wriggers	993
Process-Machine Interaction in Sheet-Bulk Metal Forming	
B.A. Behrens, R. Krimm and V. Salfeld	999
Holistic Measurement in the Sheet-Bulk Metal Forming Process with Fringe Projection	
C. Ohrt, W. Hartmann, J. Weickmann, M. Kästner, A. Weckenmann, T. Hausotte and E. Reithmeier	1005
Maturity Model for the Development of New Forming Processes Applied to the Sheet-Bulk Metal Forming	
A. Weckenmann and G. Akkasoglu	1011

Temperature Control during the APN-Process on the Steel 1.3343 Y. Lizunkova, S. Burov, T. Hassel, M.S. Bierbaum and F.W. Bach	1017
Manufacturing of Sheet Metal Components with Variants Using Process Adapted Semi-Finished Products M. Merklein, R. Plettke, T. Schneider, S. Opel and D. Vipavc	1023
Material Characterization for Sheet-Bulk Metal Forming B.A. Behrens, K. Voges-Schwieger, A. Bouguecha, J. Mielke and M. Vucetic	1029
Material Flow in Sheet-Bulk Metal Forming U. Vierzigmann, J. Koch, M. Merklein and U. Engel	1035

Heat Transfer Modelling

Analysis of Roll Gap Heat Transfers in Hot Steel Strip Rolling through Roll Temperature Sensors and Heat Transfer Models N. Legrand, N. Labbe, D. Weisz-Patrault, A. Ehrlacher, T. Luks and J. Horský	1043
Cooling of a Rotating Cylinder by a Subcooled Planar Jet - Influence of the Surface Velocity on Boiling Regime S. Devynck, M. Gradeck, J.P. Bellot, S. Denis, M. Varlez and T. Benard	1049
Implementation of the Axially Symmetrical and Three Dimensional Finite Element Models to the Determination of the Heat Transfer Coefficient Distribution on the Hot Plate Surface Cooled by the Water Spray Nozzle Z. Malinowski, T. Telejko, B. Hadala and A. Cebo-Rudnicka	1055
Determination of Heat Repartition Parameters on High Speed Pin-on-Disc Tribometer by Inverse Heat Conduction Method D. Meresse, M. Watremez, S. Harmand and L. Dubar	1061
Comparisons of Numerical Modelling of the Selective Laser Melting L. Van Belle, G. Vansteenkiste and J.C. Boyer	1067
New Technique to Model the Effect of Intermediate Induction Heat Treatment (IIHT) in Pre-Strained Aluminium Sheets R. Govindarajan, M. Zubeil, K. Siefert, T. Kleeh, D. Lorenz, T. Borrvall and C. Ageorges	1073
Metallurgical Model Fitted to Experimental Data Using a Genetic Algorithm A. Blaise, B. Bourouga and C. Dessain	1079
Optimization of the Incident IR Heat Flux upon a 3D Geometry Composite Part (Carbon/Epoxy) S. Nakouzi, F. Berthet, D. Delaunay, Y. Le Maout, F. Schmidt and V. Sobotka	1085
Experimental Determination and Modeling of Thermal Conductivity Tensor of Carbon/Epoxy Composite D. Lecointe, M. Villière, S. Nakouzi, V. Sobotka, N. Boyard, F. Schmidt and D. Delaunay	1091

Structures, Properties and Processing of Polymers

Stretch Blow Moulding of Mineral Filled PET N. Billon, J.M. Haudin, C. Vallot and C. Babin	1099
Measurement & Modelling of Slip during Plug-Assisted Thermoforming P. Martin, H.L. Choo and C.P.J. O'Connor	1105
Mechanical Analysis and Simulation of the Thermoforming Process of Thin Polymer Sheets D. Ahmad, N. Hamila, K. Lamnawar and P. Boisse	1111
The Effect of Temperature, Strain Rate and Strain on the Induced Mechanical Properties of Biaxially Stretched PET G. MENARY, C.W. Tan and C.G. Armstrong	1117
Mechanical Behavior of Highly-Flexible Elastomeric Composites with Knitted-Fabric Reinforcement B. Bekisli, J. Pancrace and H.F. Nied	1123
Measurement and Modelling of Chemical Shrinkage of Thermoset Composites Y. Nawab, N. Boyard, V. Sobotka, P. Casari and F. Jacquemin	1129

The Effect of Thermoforming of PLA-PHBV Films on the Morphology and Gas Barrier Properties	
A. Guinault, A.S. Nguyen, G. Miquelard-Garnier, D. Jouannet, A. Grandmontagne and C. Sollogoub	1135
Numerical Simulation of the Viscohyperelastic Behaviour of PET near the Glass Transition Temperature	
Y.M. Luo, L. Chevalier and E. Monteiro	1139
Shape Evolution of Carbon Epoxy Laminated Composite during Curing	
Y. Nawab, F. Jacquemin, P. Casari, N. Boyard and V. Sobotka	1145
Structure of Polymer – Multiwall Carbon Nanotube Composites	
A. Adamne Major and K. Belina	1151

Non-Conventional Processes

Development of a Process Evaluation System for Wire-EDM Applications Using an Intelligent Process Monitoring Tool	
F. Klocke, M. Schwade and A. Klink	1159
Wire-EDM of ZTA-TiC Composites with Variable Content of Electrically Conductive Phase	
R. Landfried, F. Kern, W. Burger, W. Leonhardt and R. Gadow	1165
Analysis of Surface Reaction Mechanisms on Electrically Non-Conductive Zirconia, Occurring within the Spark Erosion Process Chain	
T. Hösel, C. Müller and H. Reinecke	1171
Developments in Wire-EDM for the Manufacturing of Fir Tree Slots in Turbine Discs Made of Inconel 718	
F. Klocke, D. Welling, J. Dieckmann, D. Veselovac and R. Perez	1177
Study on Single-Pulse Discharges under Special Flushing Conditions	
M. Munz, D. Sternkopf and R. Haas	1183
Electrode Tool Wear at Electrical Discharge Machining	
L. Slătineanu, H.P. Schulze, O. Dodun, M. Coteață, L. Gherman and I. Grigoraș (Beșliu)	1189
Applications of the Electro-Contact-Discharge Machining (ECoDM) and the Analysis of Different Process Parts	
H.P. Schulze	1195
Fully Coupled Numerical Simulation of Electromagnetic Forming	
J.K. Doley and S.D. Kore	1201
Effects of the Laser Beam Interaction with the Workpiece Material	
M. Coteață, L. Slătineanu, I. Grigoraș (Beșliu) and N. Pop	1207
Microstructural Modification of Laser-Bent Open-Cell Aluminum Foams	
L. Santo, D. Bellisario, L. Rovatti and F. Quadrini	1213
Numerical Simulation of Open-Cell Aluminum Foams under Compression	
F. Quadrini, D. Bellisario, D. Ferrari and L. Santo	1219
Research on Unconventional Methods of Cylindrical Micro-Parts Shaping	
S. Skoczypiec, M. Grabowski and A. Ruszaj	1225
Characterization of Friction Modified Processing – A Novel Tool for Enhancing Surface Properties in Cast Aluminium Alloys	
M.S. Weglowski, A. Pietras, S. Dymek and C. Hamilton	1231
Technological and Economical Capabilities of Manufacturing Titanium- and Nickel-Based Alloys via Electrochemical Machining (ECM)	
F. Klocke, M. Zeis and A. Klink	1237
Single Roll Caster Equipped with a Scraper	
T. Haga, K. Akitsu, K. Kamakura, S. Kumai and H. Watari	1243
Roll Forming Set-Up Influence in the Forming Forces and Profile Quality	
E. Sáenz de Argandoña, J. Larrañaga, A. Legarda and L. Galdos	1249
Forming Limits for Shrink Flanges of Rubber Formed Parts	
J. Sinke	1255
Displacement Behavior of Wood in Boss Forming Using Open-Die Wood Forging	
S. Kajikawa, T. Iizuka and K. Yamaishi	1261

Machining and Cutting

Dynamic Simulation of the Micro-Milling Process Including Minimum Chip Thickness and Size Effect F. Ducobu, E. Rivière-Lorphèvre and E. Filippi	1269
Experimental and Numerical Determination of Cutting Forces and Temperatures in Gear Hobbing S. Stark, M. Beutner, F. Lorenz, T. Lampke, B. Karpuschewski and T. Halle	1275
Material Parameter Identification from Machining Simulations Using Inverse Techniques A. Shrot and M. Bäker	1281
Hardness-Based Flow Stress for Numerical Simulation of Machining Inconel 718 Alloy D. Umbrello, S. Caruso and G. Rotella	1287
Crack Investigation of the Multilayer TiN/Ti Coatings during the Nanoindentation Test K. Perzynski and Ł. Madej	1293
Numerical-Experimental Correlation of Distortions Induced by Machining Process on Thin-Walled Nickel Super Alloy Forged Components A. Del Prete, A.A. de Vitis and R. Franchi	1299
Tool Engage Investigation in Nickel Superalloy Turning Operations A. Del Prete, A.A. de Vitis, L. Filice, S. Caruso and D. Umbrello	1305
Cutting Speed-Feed Based Parametric Model for Macro-Geometrical Deviations in the Dry Turning of UNS A92024 Al-Cu Alloys J.M. Sánchez-Sola, M. Batista, J. Salguero, A. Gómez and M. Marcos Bárcena	1311
Machinability Study Using Chip Thickness Ratio on Difficult to Cut Metals by CBN Cutting Tool S. Thamizhmanii and H. Sulaiman	1317
Performance Evaluation of Cryogenically Treated Worn CBN Insert by Turning Process S. Thamizhmanii, K. Rajendran, M. Rasool and S. Hassan	1323
Using Image Analysis Techniques for Single Evaluation of the Chip Shrinkage Factor in Orthogonal Cutting Process M. Batista, M. Calamaz, F. Girot, J. Salguero and M. Marcos	1329
White and Dark Layer Analysis Using Response Surface Methodology G. Ambrogio, S. di Renzo, F. Gagliardi and D. Umbrello	1335
Development of a Calorimeter to Determine the Chip Heat in Drilling of C45EN B. Denkena, C. Ammermann and D. Niederwestberg	1341
Investigation on Surface Integrity of STAVAX ESR AISI 420 Martensitic Stainless Steel by Cryogenically Treated Steel Balls with Low Plastic Burnishing Tool S. Thamizhmanii, K. Rajendran, M. Rasool and S. Hassan	1347
Influence of Grinding on the Surface Properties of Cemented Carbides K. Andreas, U. Engel and M. Merklein	1353
Effect of Convex Sheared Punch Geometry on Cutting Force of Ultra-High-Strength Steel K. Kutuniva, J.A. Karjalainen and K. Mäntyjärvi	1359
Cutting Force Prediction in Drilling of Anisotropic Materials T. Matsumura, S. Tamura and P.J. Arrazola	1365
Laser Assisted Cutting of Abrasion Resistant Steel J. Kantola, K. Mäntyjärvi and J.A. Karjalainen	1371
Design an Apparatus for Obtaining to High Precision Surface of Miniature Parts Based on Magnetized Abrasive Grains Finishing Process H. Montazerolghaem and E. Soltani	1377
Application of Mechanical Vibration in the Machine Building Technology P. Sędek and M.S. Weglowski	1383

Integrated Design, Modelling and Reliability Assessment in Forming (I-DMR)

Design of Lightweight Composite Structures: A Parameter Free Structural Optimization Approach	
M. Fischer, H. Masching, M. Firl and K.U. Bletzinger	1391
A Reliability Study on the Structural Performance Prediction of Reinforced Aluminium Panels with Respect to Variations in Input Parameters of Numerical Simulations	
R.M.F. Paulo, F. Teixeira-Dias and R.A.F. Valente	1397
Numerical Simulations of Clay Tiles Compression	
J. Vignes, F. Schmidt, G. Dusserre, O. De Almeida and J.F. Dalmaso	1403