

Table of Contents

Preface

MS01: Additive Manufacturing

Rib Geometry in FDM of Light Alloys C. Bruni	3
Machine Learning Topography Prediction and Optimization in Maskless Grayscale Laser Lithography A.H.A. Lutey, D. Kuhness, S. Mckee, M. Negozio, M. Postl and B. Stadlober	12
A Comparative Analysis of LPBF Process Maps for S2 and S6 Grades Tool Steel A. Segatto, E. Saggionetto, D. Olivier, J.T. Tchuindjang and A. Mertens	22
Laser Powder Bed Fusion of Inconel® 625: Guidelines for Robust Parameter Selection Toward Optimal Quality Parts G. Locatelli, M. Quarto, S. Bocchi, C. Cappellini and G. D'Urso	31
Numerical Modelling of Directed Energy Deposition and Experimental Validation Based on Digital Image Correlation D. Kovšca, B. Starman, E. Govekar, M. Halilović and N. Mole	41
Advanced Characterization of Flexible Auxetic Resin Lattice Structures Produced by Stereolithography S. Belcuore, S. Pandini, E. Ceretti, A. Al Maharbi, M.M. Al-Hinaai and P. Ginestra	52
Evaluation of Sla Biocompatible Resins Properties for Use as Dielectric Layers in 3D Printed Capacitive Force Sensors A. Epicoco, T. Fapanni, S. Pandini, P.S. Ginestra, E. Ceretti, E. Sardini and M. Seiti	64
A Physics Informed Machine Learning Framework towards Density Prediction of Additively Manufactured Components A. Puthanveetil Madathil, O. Bylya and A. Sherlock	71
Investigation of WAAM-PAW Fabricated 316L Steel/Invar 36 Nb Alloys for the Development of Functionally Graded Materials L. Weber, A. Hor, L. Ratsifandrihana and M. Alcaraz	81
Exploring the Feasibility of Incremental Forming Applied to 3D Printed PEEK Sheets I. Ferrer, M.L. García-Romeu, G. Centeno, A. Rosa-Sainz and J. de Ciurana	92
Numerical Study of the Flexural Behaviour of Additively Reinforced Blanks E. Fulco, P. Guglielmi, A. Cusanno and D. Sorgente	101
Implementing Inkjet Printing to Manufacture Piezopolymer Films for Sensing Applications V. Stratiotou-Efstratiadis, A. Argyros, G. Sarvas, G. Oikonomou, D. Dimitriou, N. Chrysochoidis, D. Saravanos, G. Maliaris, V. Mpinas and N. Michailidis	110
Effect of Hatch Distance and Scanning Speed Combinations at Constant Volumetric Energy Density on the Materials Properties of IN939 Fabricated by Powder Bed Fusion-Laser Beam M.N. Dogu, M.M. Ikiz, G. Chapman, S. Rangaswamy, M.Y. Yalcin, S. Ozer, K. Davut and D. Brabazon	121
Integrating Topology Optimization and Lattice Infilling for Lightweight Aircraft Bracket Design via Additive Manufacturing N. Khan, F.G. Alabtah and M. Khraisheh	132
Development and Characterization of 3D-Printed PETG Specimens Embedding Continuous Carbon Fiber Strain Sensors I. Ochana, F. Ducobu, T. Rainchon and A. Demarbaix	143
Development of 3D-Printed Prototype Moulds for Thermoforming J. Rösler, J. Hornig-Klamroth and L. Dähn	153
Sustainable Electrochemical Machining of Additively Manufactured Nitinol with Deep Eutectic Solvents A.S. Perna and F. Scherillo	167
Effect of Deposition Strategy on Geometric Stability in Wire Arc Additive Manufacturing of Inconel 625 E. Viola, A.T. Silvestri and A. Squillace	174

Volumetric Anomaly Detection in LPBF by Segmentation and Classification of Exposure Optical Tomography (EOT) Image Stacks	
K. Scheibe, J. Albers, F. Jensch, C. Okolo and S. Härtel	182
Thermal Measurement during High-Velocity Oxy-Fuel Coating Process for Single and Multiple Pass Rotational Spraying	
G. Diyoke, Y. Yang, C. Schindelbacher, S. Sperling, J. Angerler and S. Härtel	196
Optimal Design and Additive Manufacturing of Polymeric Metamaterials for Energy Absorption and Impact Mitigation	
V.D. Fachinotti, E. Andreassen and S. Gouttebroze	204
Feasibility of Direct 3D Printing Foam Polylactic Acid with MEX	
B. Athanasios, P. Karmiris-Obratański, I.T. Christodoulou, E.L. Papazoglou and A.P. Markopoulos	213
Development of AMC Welding Wire and Inline Hot Rolling for Enhanced Properties of DED-Arc/Wire-Manufactured Parts	
T.S. Tübbicke, F. Dittrich and S. Härtel	221
Sensitivity Analysis and Calibration of the Heat Source in Additive Manufacturing of AlNiCo Magnets	
V.D. Fachinotti, S. Gouttebroze and A.S. Azar	232
Coconut Fibre Reinforced Photopolymer Composites via Stereolithography: Feasibility and Mechanical Performance	
V. Palomba, A. Fotia, G. Palomba, P. Corigliano, M. Chairi and G. Di Bella	239
Influence of Local Laser Power Distribution and Build-Plate Temperature on Porosity and Microstructure in Laser Powder Bed Fusion (LPBF)	
C. Okolo and S. Härtel	247
Influence of L-PBF Process Anisotropy on the Isotropic Behaviour of TPMS Structures	
A. Ciccarella, V. Colaiuda, G. Dell'Avvocato, D. Cortis, D. Orlandi, L. di Angelo and E. Mancini	254
3D Printing of Continuous Carbon Fiber-Reinforced Polymer Tee Pipe: Strategy Development and Demonstrator Fabrication	
M. Rix, Z. Kallai, J. Kipping and T. Schüppstuhl	264
Thermomechanical Modelling and Shape Prediction in 4D Printing Using FEA	
T. Andrade, M. Cadete and J. Dias-de-Oliveira	274
Advanced FE Modeling for Predicting Component Properties in Additive Manufacturing	
L. Grüger, T.S. Tübbicke, H.P. Huang and S. Härtel	285
Measurement of Forces Generated during Robotized Additive Manufacturing Process Using Pellet Extruder	
S.E. Ouassil, P. Casari, É. Paquet and G. Racineux	298
Anisotropy and Stress-State-Dependent Fracture in Additively Manufactured Metals	
E. Amini, G. Li, S. Bossuyt and J. Lian	309
Effect of Preheating Temperature on the Optimal Processing Windows of Inconel 718 Processed by Laser Power Bed Fusion	
J.T. Tchuindjang, E. Fassinato, O. Dedry and A. Mertens	316
Effects of Current Density during Electrically Assisted Friction Stir Additive Manufacturing Hole Repair of AA 7075 on a Conventional Machine	
L.L. Catalano, C.M. Norris, E.M. Mamros and J.T. Roth	329
Comparison between 2D and 3D Thermal Finite Element Models of Directed Energy Deposition	
C. Gallo, S. Van Hulle, J.T. Tchuindjang, A. Mertens, L. Duchene and A.M. Habraken	341
Additive Manufacturing of Automotive Metal Multi-Material Shunt Resistor: Cost and Carbon Footprint Analysis	
N.D. Alexopoulos, V. Zeimpekis, E. Vasileiou, T. Souxes, I. Lazaridou, L. Alberty, I. Uensal and G. Schlick	354
Resistance to Fracture of Additively Manufactured Aluminium Alloy AlSi10Mg under Plane Stress Conditions	
I. Goulas, A. Kermanidis, L. Alberty, I. Ünsal, G. Schlick, S. Gründer, D. Lenhert, F. Hengsbach and N.D. Alexopoulos	364
Effect of CuCr₁Zr Cross-Contamination Level on Work Hardening Characteristics of AlSi₁₀Mg Additive Manufactured Material	
I. Giavrouta, M. Horn, L. Alberty, I. Ünsal, G. Schlick and N.D. Alexopoulos	371

MS02: Composites Forming Processes

Topological Optimization of Shell Laminate Composites Parts Manufactured by the TFP Process P. Yu, J. Simon, C. Binetruy and N. Hamila	379
Validation of Thermoforming Simulation Models Prior to Parameterization Using Covariance-Based Input-Output Statistics – Assessing the Role of Thermomechanical Material Modeling J. Mitsch, T. Würth, J.P. Wank and L. Kärger	387
Process Influences on Plastificate and Fiber Microstructure Formation: An LFT-D Compression Molding Parameter Study C. Schelleis, L. Meckes and F. Henning	398
The Influence of Side-Dependent and Nonlinear Bending Behavior in Forming Simulation of Non-Crimp Fabrics J.P. Wank, L. Villing, B. Schäfer, J. Mitsch and L. Kärger	409
Stability of Tubular Preforms from Multi-Layer Winding of Composite Tapes Prior to Thermoforming N. Elgaby, G. Helbert, N. Hamila, R. Campos, A. Sanchez and B. Laine	419
Microwave Resin Preheating Integrated with AI-Based Flow Front Monitoring for Liquid Composite Molding Processes V. Esperto, F. Rubino, F. Tucci and P. Carlone	430
Numerical Approach to the Simulation of Vitrimers Matrix Composites Manufacturing by Infusion and Coating by Cold Spray F. Tucci, A. Viscusi, B. Palmieri, A.S. Perna, A. Martone and A. Astarita	437
Influence of Fiber Orientation Clustering Methods in Virtual Process Chains of Discontinuous-Fiber Composite Components L. Schreyer, L.S. Pusineri Yaluff, C. Krauß and L. Kärger	447
Numerical Investigation of the In-Plane Shear Behaviour of Aligned Discontinuous Fibre Composites under Processing Conditions H. Yuan, B.O. Yavuz, Y. Feng, I. Hamerton, B.C. Kim, S.R. Hallett and J.P.H. Belnoue	456
Wrinkling Behaviour of Engineering Fabrics in Diaphragm-Assisted Deep Drawing A. Tabatabaiean, C. Blair, K. Ambuehl and P. Harrison	466
Fabric Patching: A Simple Approach to Mitigate Defects S. Chen, J.P.H. Belnoue and D.S. Ivanov	475
Fibre Tension-Induced Stresses in Filament-Wound Composites J. Liu, S.V. Lomov, C.H. Park and J. Ivens	483
Machine Learning-Based Prediction of Forming-Induced Defects in Flax Woven Fabrics Using 3D Scanning and Haralick Texture Features O.H. Margoto, M.A. Batouei, V. Yang, Y. Abdin and A.S. Milani	491
Thermo-Chemical Modeling and Experimental Validation of Pultruded Glass Fiber Reinforced Composites J. Harris, S. Gharat, L. Wang, A. Zolali, A. Taub and M. Banu	504
Application of a Discrete Finite Element Modeling Approach to Form a Near-Uniform Thickness Compound Curvature Composite Part K.D. White and J.A. Sherwood	517
Controlled Preform Consolidation for Manufacturing Difficult Resin System Composites D.R. Palubiski, N. Shirshova, E.S. Greenhalgh, M.S.P. Shaffer and D.S. Ivanov	527
Process-Induced Deformations on Composite L-Shaped Part: Numerical Prediction and Compensated Mould Design E. Delsol, P. Olivier, B. Castanié, W. Azoti and L. Ratsifandrihana	537
Multi-Stage Consolidation Strategy to Improve Impregnation Quality in Thermoplastic UD Tapes O. Eryilmaz, O. Yuksel, M. El-Jakl, N. Karakaya, G. Ozkoc and B. Caglar	545
Numerical Modelling of Intimate Contact for Thermoplastic Composite Joints P. Waroquier, A. Levy, S. Le Corre, J.L. Bailleul, J. Serra and E. Bertevas	554

Cost-Effective One-Shot Stamping of Steel-Based High-Performance Lightweight Multi-Material Structures	
H. Wu, M. Mohamed, C. Gao, Z. Ding, M. Ganapathy, P. Biswas, R.K. Verma, A. Taylor and N. Li	566
A CT-Based Methodology for Mesostructural Characterization of Unidirectional Continuous-Fiber Polymer Composites Using Line-Profile Descriptors	
R. Mele, P. De Sio, F. Tucci and P. Carlone	573
Prediction of Residual Stress in Carbon Fiber Reinforced LM- PAEK Composites	
M.R. Gongati, L. Warnet, F. Rondina, E.T.J. Klompen and R. Akkerman	588
Environmental Impact Assessment of Thermoplastic Pultrusion of GF-PP Pre-Consolidated Tapes	
P. De Sio, E. Cozzolino, F. Tucci and A. Astarita	599
Simulation and Experimental Investigation of the LRI Process for Particle-Filled Resins in Aerostructure Applications	
N. Siddig, M. Mtibaa, M. Coupé and A. Guinoiseau	611
The First European Benchmark Exercise on Squeeze Flow Testing of High-Performance C-SMCs: Review	
C. Qian, M. Duhovic, L. Schreyer, M. Olma, A. Gebhard, W.J.B. Grouve, D. Schommer, F. Gortner, T. Neumeyer, L. Kärger, M. Hohberg, H. Yuan, A.J. Imbsweiler, L.S. Ramirez, S. Simaafrookhteh, J. Ivens, S.V. Lomov, G. Bieleman, F. Mahé, C. Binetruy, A. Kapshammer, Z. Major, D.S. Ivanov, J.P.H. Belnoue, A. Koptelov, J. Jakimow, Y. Aitomaki and D. Ramantani	621
A Unified Simulation Environment for Thermoforming and Distortion Prediction of CFRTP Aircraft Components	
M. Duhovic, L. Handl, M. Müller, D. Schommer, T. Hoffmann, J. Schlimbach and T. Neumeyer	632
Iterative Un-Forming of Highly Aligned Discontinuous Preform/Material	
Y. Feng, H. Yuan, B.O. Yavuz, I. Hamerton, B.C. Kim, S.R. Hallett and J.P.H. Belnoue	644
Mechanical Response of Flax Rovings under Compaction: Experimental Investigation	
S. Zidi, T. Larquemin, A. Hivet, G. Hivet and D. Duriatti	653

MS03: Extrusion and Drawing

Mechanical Evaluation of 6060 Aluminum Alloy under Elevated Extrusion Ram Speed Using Liquid Nitrogen Die Cooling	
E. Giarmas, E.K. Tzintzimis, K. Tsongas and D. Tzetzis	665
An Experimental Investigation of the Effect of Compression Calibration on the Ductility of AA6061 Extrusions	
M.C. Uzun and T. Welo	678
Numerical Investigation of Round Profile Production: A Fem-Based Comparison between Friction Stir Extrusion and Conventional Extrusion	
C. Acerbi, M. Negozio, A.H.A. Lutey, M. Felci, U.F.H. Suhuddin, H.S. Rana, B. Klusemann and S. Bocchi	687
Compensating Property Fluctuations in Cold Extrusion Using Adaptive Dies	
C. Siedbürger and P. Groche	697
Lightweight Battery Housings from Thin-Walled, Large-Scale Aluminum Profiles by Hot Extrusion	
O. Schulz, S. Wurth, A. Selvaggio, J. Gebhard, Y.P. Korkolis, P. Bieker and T. Kloppenborg	713
Calibrating a Lode-Parameter-Dependent Damage Evolution Equation to Cold Extrusion Experiments	
R. Gitschel, A.E. Tekkaya and Y.P. Korkolis	724
Effect of Chemical Composition on Hot Extrudability and Tribological Behavior of 7000 Series Aluminum Alloys	
S. Ngermbamrung, K. Dohda, T. Funazuka, J. Oshima and T. Shiratori	733
Using Tungsten Inert Gas Welding Equipment to Locally Heat Tubes and Achieve Inhomogeneous Thickness in Tube Sinking Processes	
L.I. Besong and J. Buhl	742
Charge Weld Evolution in Profile Extrusion: Variability across Billets and Multi-Profile Designs	
I. Kniazkin, I. Kulakov and N. Biba	751

Development of a System for Ultrasonic Die Oscillations during Extrusion of Aluminum Hollow Profiles	
T. Thomas, M. Negendank, N. Laengst, V. Merklinger, J. Maier and S. Mueller	766
Detection of Charge Welds in Lateral Angular Co-Extrusion Using Non-Destructive Testing	
A. Verschinin, F.P. Schäfke, N. Mohnfeld, H.J. Maier, J. Uhe, C. Klose and S. Barton	777
Comparative Characterization through Torsion Tests of Primary and Secondary Aluminum Alloys for the Extrusion Process	
N. Lai, S. Di Donato, L. Donati, R. Pelaccia, B. Reggiani and M. Negozio	789
Transient Thermal Analysis of Multiple Extrusion Runs with Nitrogen Cooling by Means of Qform Code	
R. Pelaccia, S. Di Donato, M. Negozio, N. Lai, B. Reggiani and L. Donati	807
Numerical Data-Driven Modelling of Modified Samanta Process for Cold Extrusion of Gears	
T. Deliktas, M. Görz, A. Schenek, M. Speth and M. Liewald	821

MS04: Forging and Rolling

Experimental-Numerical Approach to Determine the Heat Transfer Coefficients for Compound Forging Processes	
N. Mohnfeld, M. Schute, S. Peddinghaus, J. Uhe and B.A. Behrens	837
Tailored Temperature Gradients in Hybrid Components: Influence of Variable Process Parameters under Cold and Preheated Conditions	
N. Gerke, H. Amend, J. Peddinghaus, K. Brunotte and B.A. Behrens	848
Microstructure Modification of Hot Formed Shafts through Customised Spray Cooling from the Forming Heat	
M. Hammes, A. Piwek, N. Mohnfeld, J. Peddinghaus, J. Uhe and B.A. Behrens	859
Quasi-Isothermal Forging of Steel-Encapsulated Ti-6Al-4V Billets	
J. Möckelmann, J. Peddinghaus, K. Brunotte and B.A. Behrens	870
Characterisation of the Flow Behaviour of Powder Metallurgical Semi-Finished Products for Lubricant-Impregnated Cold Forming Concepts	
K.R. Prajapati, R. Laeger, N. Mohnfeld, J. Peddinghaus, J. Uhe and B.A. Behrens	882
Experimental Characterisation of TRIP Effects of 31CrMoV9 for Hot Forming	
S. Peddinghaus, N. Mohnfeld, J. Uhe and B.A. Behrens	891
A Novel Modified SLAB Method Approach for Efficient Energy Assessment in Ring Rolling Showing Fishtail Effect	
C. Cappellini, C. Giardini, G. Locatelli and M. Quarto	903
Workpiece-Based Signatures for Machine Diagnostics in Die Forging with Flash	
C. Glaubitz, M. Rothgänger, E. Ortlieb, J. Peddinghaus and K. Brunotte	913
Fine-Blanking Punch Edge Control by Chamfering and Plasma-Nitriding under Excessive Load Situation	
K. Fuchiwaki and T. Aizawa	923
ML-Based Prediction of Tool Kinematics in Cold Forging of Tailored Hollow Shafts with Variable Wall Thickness	
A. Weiss and M. Liewald	932
Fast Inverse Identification of the Coefficient of Friction in Cold Strip Rolling Using a Physics-Informed Neural Network	
C. Overhagen and R. Martin	943
Process Optimization for Forging an AA6082 Automotive Upper Control Arm	
L.J. Zhou, L.G. Wang, M.X. Shi, A.D. La Rosa, E.F.R.d. Costa and X. Ma	956
A Qualitative Study of the Contact Pressure Distribution in Cold Rolling	
S. Younas, J. Havinga, C. Hol and T. van den Boogaard	970
Experimental Characterisation of Service-Degraded H13 Tool Steel and Numerical Assessment of Die Plasticity Risk in Hot Forging of Nickel-Based Superalloys	
J. Agirre, U. Ibarretxe, D. Abedul, N. Otegi and L. Galdos	981
Extension of the Lemaitre Damage Model to Account for Static and Dynamic Recrystallization Behavior	
M. Gouverneur, D. Bailly and J. Lian	993
Profile Contour and Flatness Control Model for Hot Strip Rolling	
N. Souto, N. Legrand and S. Jimenez	1005

Predicting the Influence of 42CrMoS4 Variability on Cold Forming through Constitutive Modelling and Fracture Analysis	
A. Barandiaran, L. Galdos, D. Abedul and J. Agirre	1017
Impact of Separating Agents on the Deformation Regime in Aluminum Roll-Cladding Processes	
F. Muhr, B. Höniger, P. Niemietz, P. Frohn-Sörensen, B. Engel and T. Bergs	1030
Rolling-Induced Anisotropy in High-Cycle Three-Point Bending Fatigue of an AA7075-T6 Plate	
A. Prospathopoulos, A. Argyros, M. Pappa and N. Michailidis	1041
Relating the Cold Rolling Pass Reduction to the Microstructural Evolution and Formability in DP800 Steel	
M. Hribsek, N. Fehleemann, I. Biermann and S. Münstermann	1052

MS05: Formability of Metallic Materials

Thickness Scaling of Forming Limit Curves	
H. Aretz	1065
Work Hardening of Dual Phase Steel in Subsequent Tensile Testing with Post-Necking Large Pre-Strain	
T. Matsuno, K. Hokimoto, K. Shimizu, T. Hama and Y. Honda	1074
Crystal Plasticity Finite-Element Simulations of Cup Drawing of a ZX10 Magnesium Alloy Sheet	
T. Hama and N. Miyazawa	1083
<i>In Situ</i> EBSD Characterisation of Anisotropic Creep Behaviour in a Thick AA2139 Part during In-Forming Artificial Ageing	
C. Gautier, P.A. Dubos, D. Gloaguen, B. Girault and M. Rollin	1090
Microstructural Modification and Bendability Improvement in 1300 MPa Steel via Induction Surface Heat Treatment	
A. Kaijalainen, A. Abdelghany, O. Haiko, A.J.T. Hoikkaniemi and A.P. Pokka	1099
The Interaction of n- and r-Values and Total Elongation in Forming Limit Curves' Theories	
R. Borbely, B.V. Toth-Nagy, B. Kecskes, R.Z. Keresztes and G.J. Beres	1106
Theoretical and Experimental Forming Limit Evaluation of High-Strength Steels up to 1500 MPa	
R. Borbely, R.Z. Keresztes and G.J. Beres	1115
Evaluation and Comparison of a few Methods for the Strain-Path Correction of FLCs	
G. Mainguy, X. Lemoine and T. Balan	1125
Investigating the Formability of Aluminium Alloy Tubes by Rubber Bulge Testing	
C. Moon, E.C. Sariyarlioglu and T. Welo	1131
Influence of Hydrogen Content on the Ductile Rupture of Advanced High-Strength Steels	
L. Germain, F. Vucko, F. Peltier and S. Thuillier	1138
Asymmetric Hole Expansion Test (aHET) for Direct Measurement of Orientation-Dependent Tensile Fracture Strain	
R. Pérot, V. Grolleau and D. Mohr	1147
A Comparative Study of Multiple Cutting Methods on Thin Ferritic Steel for Tensile Test Experiment	
T. Azzouni, L. Iona, P. Hegele, W. Volk and C. Hartmann	1157
Effect of Tool Edge Geometry on Sheared Surface Formation in Blanking of Oxygen-Free Copper	
T. Shiratori, Y. Ichiyanagi, K. Watanabe and A. Tatsuhiko	1168
Experimental Investigation of the Influence of Load Direction Changes on Damage in Dual Phase Steel and Aluminum Alloy	
P. Lennemann, A.E. Tekkaya and Y.P. Korkolis	1176
Stochastic Forming Limit Curves: Construction of a Probabilistic Tool for Failure Assessment	
O. Ameline, M.Y. Jedidi, A. Persoons and C. Labergere	1182
Forming Limit Test of Asymmetric Al-Polymer Laminate Composite Film	
C. Sagong, T.J. Jang, T. Ahn and J.W. Yoon	1196

Hole Expansion Performance Assessment of Quenched and Partitioning Steel through a Fully Anisotropic Fracture Modeling T.A. Aksen, Z. Li and J. Lian	1207
Global and Local Formability of 3rd Generation Advanced High Strength Steels A. Payà, M. Carpio and D. Frómeta	1217
Formability Test for Characterizing the Mode II–III Fracture Transition I.M. Almeida, J.P.G. Magrinho, P.A.F. Martins and M.B. Silva	1225
The Influence of Uphill Quench on the Microstructure and Properties of Particle-Reinforced Aluminum Matrix Composites R. Pan, B.S. Liu, N. Guo, Y.S. Zeng, Y.H. Chang and Z.Y. Li	1233
Automated Testing and Calibration of Sheet Metal Models C. Ndiritu, Y. Haoues, N. Decultot and S. Thuillier	1244
Springback Prediction of 6XXX-Series Aluminum: Effect of Hardening Model, Friction and Binder Loading J. Arciero, K. Cheong, M. Howeyze, I. Escorza, A. Wankhede, K. Kannan, S. Thokala, C. Leppin, D. Anderson and C. Butcher	1253
Necking Limits of Anisotropic Metal Sheets Using M-K Theory and Improved Plasticity Models Y. Hou, M. Trask and Y.P. Korkolis	1270
Effect of Continuous Bending under Tension on Dual-Phase Steels G. Vincze, R.C. Alves, R.O. Santos and M.C. Vincze	1280
Heterostructure High Entropy Alloys in the CoNiFeMn-Mo System Intended for Deep Drawing Applications K. Cichocki, A. Wójcik, P. Lisiecka-Graca, T. Warski and K. Muszka	1287

MS06: Friction and Wear in Metal Forming

Gallig-Free Dry Net Shaping of Titanium and Titanium Alloy Eye-Glass Frame Parts toward Green Manufacturing T. Aizawa, T. Kihara and T. Shiratori	1297
Selection and Investigation of Thermoplastic Materials as Forming Tools for Warm Dry Forming of Magnesium and High-Strength Aluminum Sheets S. Vakulenko, K. Weigel and M. Dix	1306
Multiscale Simulation of Asperity Flattening with Realistic Surface Topography and Microstructure A. Carley-Clopton, G. Winther, J. Hazrati and C.V. Nielsen	1316
Tool Wear Investigation Nickel Plated Steels for Battery Shell Production J. Venema, V. Pater, J. Wörmann and M. Appelman	1329
Numerical Analysis of Roughness Transfer Mechanism during Skin-Pass Rolling H.A. Derazkola, L. Jacobs, S. Kiakidis, T. van den Boogaard and J. Hazrati	1336
Modeling the Effect of Lubricants on Surface Conditions in Plane-Strain Upsetting Tests L. Koch, H. Brüggemann, S.B. Tamilselvan, E. Scharifi and J. Lian	1346
Improvement of Wear and Corrosion Resistance of X46Cr13 Martensitic Stainless Steel by Cryogenic Treatment I. Espinosa, S. Menargues, J.D. Gutierrez, J.A. Picas, J.A. Navas Lopez and M.T. Baile Puig	1358
Assessment of the Potential of CO as a Lubricant in Cold Forging of Low-Carbon Mild Steel D.R. Alba, A. Weiss, G. Reichardt and M. Liewald	1368
A New Ex-Situ Method for Real Contact Area Determination for Sheet Metal Forming A. Guinea, A. Aginagalde, E. Saenz de Argandoña, J. Mendiguren, W. Tato, I. Llavori, L. Blunt and A. Zabala	1377
Sliding Distance Dependency and Third Body Particle Influence in Flat Strip-Draw Testing of Aluminum Sheet for Friction Characterization in Automotive Stamping L. Rocchi, J. Filzek and C. Leppin	1389
Towards Multi-Scale Friction Modelling for Bulk Sheet Metal Forming Applications A. Barandiaran, A. Zabala, D. Abedul, J. Hazrati and L. Galdos	1405
Effect of Surface Texture on Sheet Metal Formability in Boundary Lubrication Regime J. Hazrati and M. de Rooij	1414

MS07: Incremental and Sheet Metal Forming

Hot Double-Sided Incremental Forming of Fiber-Reinforced Thermoplastics: Process Capabilities and Challenges J.E. Rath, D. Nettig and T. Schüppstuhl	1425
Classifying Parameters and Target Variables in Incremental Sheet Forming of Fiber Reinforced Polymers D. Nettig, J.E. Rath, J. Kipping and T. Schüppstuhl	1434
Comparative Analysis of Die Materials for Reducing the Rebound-Effect in Electromagnetic Forming Processes R. Walther, L. Fleischer, M. Linnemann, V. Psyk and V. Kräusel	1449
Comparison of PEEK and UHMWPE Cranial Implants Fabricated at Room Temperature Using Single Point Incremental Forming (SPIF) E. Mamros, A. Clark, P. Barnett, I. Ragai, S. Derek and K. Laser Jr	1458
Combined Finite Element Simulation and Regression Modeling for Predicting Final Protrusion Length of Twisted Hairpin Legs in Stators D. Han, D. Cho, S. An and J.W. Yoon	1471
Design and Development of a Hydrostatic Support Device for Hot Incremental Sheet Forming of PMMA R. Conte, S. Trimarchi, F. Gagliardi, L. De Napoli and G. Ambrogio	1479
Numerical Study of Process-Specific Disturbances in Hollow Embossing Rolling F. Reuther, V. Psyk and V. Kräusel	1485
On the Surface Quality of Incrementally Formed Niobium Sheets A. Formisano, A. Astarita, M. Garlaschè, U. Prisco, F. Scherillo and M. Durante	1495
Numerical Investigation and Optimization of Blank-Holder and Magnetorheological Actuators Configurations for Deep Drawing Objectives M. Dal Maso, E. Simonetto, A. Ghiotti, S. Bruschi, S. Filippi, L. Hauser and M. Liewald	1502
Feature Based Investigation of the Forming Behavior of Titanium Grade 1 for Bipolar Plate Manufacturing J. Sommer, L. Uhlmann, M. Meerkamp, T. Herrig and T. Bergs	1514
Pressure Wave Analysis in Electrohydraulic Forming - A Multiple Sensor Approach L. Langstädtler, A. Tausendfreund and C. Schenck	1526
Numerical Modeling of Controlled Multi-Step Expansion in Plasma Arc Welded AISI 316 Stainless-Steel Tubes F. Borda, S. Caruso and L. Filice	1534
Multivariate Analysis of Scrap Web Sheared Surface Roughness for Punch Wear Indicators in Sheet-Metal Forming J. Moon, A. Frigge, P. Niemietz, T. Herrig and T. Bergs	1543
Extending the Process Window of Sheet Injection in AW6082-T6 Aluminium via Localised Laser Heat Treatment J.P.G. Magrinho, A. Cusanno, M. Jesus, A. Piccininni, G. Palumbo and M.B. Silva	1552
Gas Based Hot Forming of Micro-Channels for High Strength Aluminum Alloy Sheets K.J. Tilly, E. Scharifi and J. Lian	1560
Mechanical Characterization by Profilometry-Based Indentation Plastometry of Locally Heat-Treated Blanks for Sheet Injection Applications A. Cusanno, J.P.G. Magrinho, A. Piccininni, P. Guglielmi, D. Sorgente, G. Palumbo and M.B. Silva	1568
Influence of Process Parameter Variations on Stamping-Bending Component Quality M. Buchner, M. Damaškovič, L. Koller, W. Volk, M. Althoff and C. Hartmann	1576
Hybrid Hot Forming of High-Strength Aluminum Alloys: Influence of Local Deformation on Post-Aging Mechanical Properties M. Gröbel, K.J. Tilly, E. Scharifi and J. Lian	1587
Mitigation of Geometric Inaccuracy in Closed-Contour Incremental Sheet Forming via Curvilinear Toolpath Z. Mu, Y. Lee, J. Abell, A. Taub and M. Banu	1597
Multi-Stage Roller Embossing of Bipolar Plate Microchannels Using 3D-Printed Tooling M. Khademi, P.N. Zhang, M.P. Pereira and M. Weiss	1606

Experimental and Numerical Investigation of AA6061 Tube Flowformability K. Mocellin, N.M.R. Kauta and P.O. Bouchard	1622
Resistance Heating in an Atmosphere Suitable for XHV with Thin Aluminium Film Coating B.A. Behrens, S. Hübner, U. Holländer, A. Langohr, A. Schnettger, H. Depke and L. Albracht	1631
Rubber Forming as a Novel Manufacturing Approach for Bipolar Plates in Fuel Cell Systems B.A. Behrens, S. Hübner, S. Pauli, H. Rüschkamp, S. Kimmina, D. Fink and B. Yaaalimadad	1640
Single Point Incremental Forming (SPIF) of Stainless Steel 304 Quilted, Laser Welded Blanks E. Mamros, D. Shaffer, I. Ragai and A. Clark	1655
Reducing the Uncertainty in Flow Forming of Metastable Austenites L. Kersting, M. Koyuncu, B. Arian, J.R. Vasquez, A. Trächtler, W. Homberg and F. Walther	1665
Agile Tube Roll Forming, a New Process Architecture for Manufacturing of Longitudinally Welded Tubes A. Beigzadeh, E. Simonetto, A. Ghiotti and S. Bruschi	1679
Finite Element Analysis of Flexible Roll Forming of Height Variable Profiles Made of Advanced High Strength DP980 Steel M.O. Görtan, Ü. Türkmen, I. Kuzucu, E. Çivisöker and R. Ervan	1688
Innovative Bending Strategies - Optimization of Bent Components to Suit Individual Load Cases Using Overbending and Underbending Strategies for the Free-Form Bending Process V. Böhm, T. Spörer, M. Ott, G. Fuchs, P. Richter, J. Tschannerl, L. Kong, A. Ismail, S. Münstermann, B. Lohmann and W. Volk	1696
Local Reinforcement of SPIF-Formed Mg-Zn-Zr Alloy Thin Sheets by TIG Welding E. Ozden, O. Kurtov, H. Vanhove and J.R. Duflou	1706
Hybrid Analysis of Tool Geometry and Process Noise in Fine Blanking through Simulation and Experiment D. Gelbich, F. Schweinsaupt, T. Stoel, P. Niemietz, T. Herrig and T. Bergs	1715

MS08: Innovative Joining by Forming

Enhancing the Bonding of Insulated Homogeneous Interfaces in Factory Joints via Ultrasonic Vibration Z.Y. Liu, L. Yin, W. Yang, J.H. Gao, Y. Lv, Z.H. Wu and C.X. Wang	1731
Development of a Novel Rivet-Based Joining-By-Forming Process Using Flat Dies D.Y. Unni and M. Strano	1738
Influence of Tumbling-Induced Geometric Anisotropy on the Mechanical Performance of Self-Piercing Rivet Joints J. Sarris and M. Lechner	1747
Experimental and Numerical Evaluation of L-PBF Printed Tool for Friction Stir Welding M. Zambelli, S. Bocchi, M. Negozio, G.D. D'Urso, C. Giardini and L. Antonini	1757
Micro Friction Stir Spot Welding for Copper Current Collector Applications - An Experimental Study N. Schwichtenberg, M. Tesch, M.E. Sigl, M. Goeldner and M.F. Zaeh	1768
Influences of the Rolling Parameters on Multi-Material Copper-Aluminum Composites via Compound Casting A. Ringel, A.Z. Demirezen, J. Hoyer, D. Bailly, S. Kammerloher, W. Volk and J. Lian	1781
A Hybrid Joining Strategy for Al-Cu Bimetallic Sheets Produced by Friction Stir Welding I. Papantoniou and D.E. Manolakos	1795
Potentials of Heat Superimposed Rotary Friction Welding for Steel-Aluminium Joints A. Piwek, J. Peddinghaus, J. Uhe, K. Brunotte and B.A. Behrens	1803
Tool Geometry Effect in Friction Stir Extrusion of Seamless Tubes from Aluminium Chips R. Puleo, S. Russo, G. Buffa and L. Fratini	1814
Effect of Fiber Length in Friction Stir Welding of Discontinuous Composites A. Clark, P. Barnett, E. Mamros, B. Young and I. Ragai	1823
Experimental and Numerical Study of Steel-Aluminium Rotary Friction Welding with Heat Flux via Subroutine A.T. Mathew, A. Piwek, J. Mayer, N. Mohnfeld, B.A. Behrens and J. Uhe	1834

Influence of Rolling Temperature on the Mechanical and Formability Properties of AA1050/AZ31/AA1050 Roll-Bonded Sheets	
M. El Mehtedi, P. Buonadonna, B. Reggiani, R. Pelaccia, L. Donati, G. Loi and M. Carta	1849
Effect of Surface Conditions and Tool to Interface Spacing in Refill Friction Stir Spot Welding of Aluminum to Titanium	
L. Malaske, U. Suhuddin and B. Klusemann	1861
Numerical Analysis of the Influence of a Movable Die on Joint Formation in Versatile Self-Piercing Riveting	
P.K. Kaimann, M. Bobbert and G. Meschut	1870
A Numerical Study on the Mutual Influence of Joint Orientation and Component Geometry in Non-Rotationally Symmetric Clinched Joints	
D.R. Devulapally and T. Tröster	1882
Study on the Influence of Gas Pressure Loading Curve on Interface Weld Ratio in Superplastic Forming/Diffusion Bonding of Four-Layer Sandwich Structures	
S.J. Liu, Y.H. Mu, X.H. Li and H.L. Lei	1891

MS09: Lionel Fourment on: Optimization, AI and Inverse Analysis in Forming

Advanced Control of Stretch-Reducing Mills Using Artificial Intelligence	
L. Antonini, M. Quarto, C. Giardini, G. Pellegrini and M. Zambelli	1907
Proxy-Physics-Informed and Transfer Learning Networks for Radial-Axial Ring Rolling (RARR) under Varying Data Availability	
L. Quagliato, J. Seitz, M. Perin, D. Malejka, T. Moser, C. Zanella and B. Kuhlenkötter	1918
Material Parameter Identification Using Bayesian Data Assimilation and Biaxial Tensile Test	
A. Yamanaka and S. Shimaoka	1934
Innovation of the “Cut-Clamp-Play” Concept for Robust and Efficient Sheet Metal Material Characterization	
A. Maček, B. Starman, M. Halilović, F. Pierron, P. Lava and S. Coppieters	1941
Method of an Automated Tool Design of Punch-Bending Processes Using the Asset Administration Shell	
H. Peters, A. Mazur, B. Chaudhary, L. Kersting, A. Trächtler and B. Hammer	1947
Uncertainty Detection in Sheet Metal Bending Processes with Machine Learning	
T. Parreira, D. Cruz, A. Marques, P. Prates, M. Oliveira, A. Santos, B. Ribeiro and A. Pereira	1959
AI-Driven Design and Optimization of Bending Processes	
D. Fernandes, T. Parreira, D. Cruz, A. Marques, P. Prates, M. Oliveira, A. Santos, D. Neto and A. Pereira	1968
Hybrid Numerical and Data-Driven Modelling for Defect Prediction in Screw Press Hot Bulk Forging of the En AW-6060 Part	
A. Alimov, Y. Jiang, M. Gardill and S. Härtel	1978
Machine Learning Algorithms Applied to the Identification of CPB06 Yield Criterion Parameters	
A. Marques, T. Parreira, B. Ribeiro, P. Prates and A. Pereira	1991
Geometry-Based Concept for Automatic Cut Planning and Flattening of Sheet Metal Components	
J. Korn, C. Acksteiner, S. Langula, C. Guillaume and A. Brosius	2001
Towards Single-Test Anisotropy Calibration: Sensitivity, Identifiability and Validation of YLD2000-2d	
B. Starman, A. Maček, M. Halilović, P. Lava, F. Pierron and S. Coppieters	2009
Towards DIC-Subset-Independent Machine Learning Models for Constitutive Parameter Identification in Sheet Metal Forming	
D. Mitreiro, J. Henriques, P.A. Prates and A. Andrade-Campos	2017
Application of Reference-Free Strain Measurement to Assess the Deformation Level of Pre-Deformed Components	
M. Rossi, G. Tanoni, M. Anedda, M.C. Fioretti and E. Principi	2025
Improving FEMU Calibration from a Single Heterogeneous Test through a Data-Driven Approach: An Exploratory Study	
M. Gonçalves, R. Amaral, S. Thuillier and A. Andrade-Campos	2032

Robust Performance Optimization Using Bayesian Optimization and Extreme Value Theory

A. Persoons, V.D. Rocha, L. Giraud-Moreau and P. Lafon

2041

MS10: Machining, Cutting and Severe Plastic Deformation Processes

Exploring Artificial Intelligence for Tool Wear Prediction in Turn-Milling

C. Lerez, V. Artiushenko and M. Hackert-Oschätzchen

2053

The Role of Tool Texture Design on the Chip Formation in PEEK Machining

A. Bottin, R. Bertolini, H. Gonzalez, E. Ukar and S. Bruschi

2061

Condition-Robust Tool Remaining Useful Life Prediction under Highly Variable Milling Conditions

S. Ferrisi, S. Lang, M. Afrasiabi, R. Guido, D. Umbrello, G. Ambrogio and M. Bambach

2071

Cryogenic Machining of a Laser Powder Bed Fusion-Processed AlSi7Mg Aluminum Alloy

R. Bertolini, T. Islam, S. Pan, E. Ghinatti and S. Bruschi

2083

On the Use of Adaptive Mesh Refinement for Modelling the Taylor Impact Test with the CEL Formulation

F. Ducobu, O. Pantalé, L. Spitaels and D. Umbrello

2092

Potential of Cutting Fluid Application in Gear Hobbing of High-Strength Materials

M. Beutner, M. Hackert-Oschätzchen, M. Eich and B. Karpuschewski

2100

Influence of the Crystal Structure of AlCrN on Tool Coating Properties and Wear in Dry Gear Hobbing

N. Paucke, M. Beutner, A. Lümekemann, K. Thomas, M. Učík, H. Bolvardi and M. Hackert-Oschätzchen

2111

Scaling Methodology for Large Boring Bars with Tuned Mass Dampers

M. Etxebeste, I.M. Arrieta, G. Ortiz de Zarate and P.J. Arrazola

2121

Experimental and Analytical Study of Cutting Force and Temperature in Drilling of CF/PEEK Composite

S. Tamura and T. Matsumura

2132

Static Finite Element Modeling of Milling in Flexible Composite Plates

M. Nutte, E. Riviére-Lorphèvre, V. Dambly, P.J. Arrazola, I. Lazoglu, A. Granjon and F. Ducobu

2141

Laser Surface Texturing of Cylindrical Ejector Pins for Functionalization of Injection Molding Systems: A Preliminary Study

A. Sposato, M.R. Saffioti, C. Morano, F. Modica, G. Rotella, I. Fassi and V. Basile

2151

Drilling of Fiber Metal Laminates for Aerospace Applications: Experimental Evaluation of Surface Treatment Effects on Adhesive Strength and Hole Quality

A. Sposato, M.R. Saffioti, Z. Liu, E. Simonetto, G. Rotella and D. Umbrello

2159

Classification of Cutting Tool Wear Evolution in CNC Turning Using Convolutional Neural Networks

D.A. Gartzonikas, N.E. Karkalos, A.P. Markopoulos and P. Benardos

2167

Towards Solid-State Recycling of Ti6Al4V: Defining a Sustainable Machining Process Window for Low-Oxidation Chips

G. Ortiz de Zarate, I. Rodriguez, A. Oruna, H. Otalora, M. Etxebeste and P.J. Arrazola

2175

Numerical-Experimental Study of Delamination in Crystalline Photovoltaic Panels to Support Efficient Recycling

A. Sposato, G. de Martino, G. Stigliano, C. Cignali, M. Dassisti and D. Umbrello

2186

Integrated Artificial Neural Network-Based Approach for Predicting Surface Roughness Parameters in Laser Surface Texturing of Ti6Al4V

A. Sposato, G. Carpino, M.R. Saffioti, G. Rotella and D. Umbrello

2198

MS11: Material Behaviour Modelling

Improved Mapping of Yield Locus Distortion through a Strain-Dependent Calibration of the Barlat Yld2000-2d Yield Criterion

M. Rentz and M. Merklein

2209

A Novel Approach for Determining the Bauschinger Effect in Dual-Phase Steel Sheets with Tensile-Compression Tests

A. Häckel, D. Naumann and M. Merklein

2218

Numerical Quantification of Structure-Property Relations in DP800 - Influence of Phase Material Models in RVE	
N.C. Fehleemann and S. Münstermann	2226
Empirical Modelling of the Cold Crystallization of PLA	
G.J. El Hajj Sleiman, E. Labalec and G. Colomines	2237
Laser-Induced Solid-State Foaming of HIPed Ti6Al4V-ELI Alloy	
P. Guglielmi, A. Cusanno, A. Piccininni, E. Fulco, D. Sorgente and G. Palumbo	2245
1D Stress Evolution Prediction via Thermodynamically-Informed Neural Networks	
A. Fallahnejad, E.S. Perdahcioglu and T. van den Boogaard	2257
Deriving Macroscopic Damage Properties by Micromechanical Modeling of DP1000	
M. Neite and S. Münstermann	2268
Texture Data Preparation for Finite Element Simulations of Puncture Tests: Insights from the VPSC Approach	
A.C. Ott, L. Schwarzmeier, J. Kronsteiner, N.P. Papenberg and T. Antretter	2280
Modeling Transient Temperature-Driven Microstructure Evolution in Inconel 718 during Hot Forming	
N. Elekyabi, H. Brüggemann, E. Scharifi and J. Lian	2290
Quantifying Grain Boundary and Orientation Effects on Copper under Compression: A Crystal Plasticity Finite Element Approach	
M.B. Paçacı and H. Darendeliler	2302
Experimental Study on the Relationship between Cooling Rate, Secondary Dendrite Arm Spacing and Tensile Properties in Aluminum Casting	
T. Ahn, J. Lee, J. Lee and J.W. Yoon	2315
Predictive Modeling of 42CrMo4 Hardness after Two-Step Heat Treatment Using Symbolic Regression	
J. Albers, F. Dittrich and S. Härtel	2324
How to take the Lüders Plateau into Account in the Formability Prediction of Steel Sheets	
X. Lemoine	2339
Microscale to Macroscale Analyses of Superplasticity of Ti-6242S Titanium Alloy	
M. Arowolo, V. Velay, V. Vidal and M. Dehmas	2346
Study on the Effects of Grain Shape, Size and Size Distribution on the Mechanical Behavior of Metals	
R. Bocan, E.S. Perdahcioglu and T. van den Boogaard	2363
Investigation of Friction Coefficient at Stack Compression Tests	
M.L. Kölös, I. Nagy-Gombai, G. Kalácska and G.J. Beres	2373
Mechanical Performance of a Steel-Polymer Biphase Lattice Structure	
E. Mancini, A. Ciccarella, A. Di Giuliano, L. Micarelli, G. Dell'Avvocato and K. Gallucci	2381
Further Developments of Hill-Gotoh Theory of Anisotropic Sheet Metal Plasticity	
W. Tong	2389
A Compact Micromechanical Model for the Elastic-Viscoplastic Deformability of PLA-Hemp Biocomposites	
N. Niang, S. Holopainen, T. Barrière, V. Placet and X. Gabrion	2396
Modeling the Influence of Material Variabilities on the Forming and Failure Behavior of PP/PE Cores in Metal-Polymer-Metal Sandwich Sheets	
J. Pusicha and J. Buhl	2405

MS12: Advanced Numerical and AI Strategies for Material Forming

Numerical Investigation of Deposition Efficiency Influencing Factors in the Friction Surfacing Process	
A. Elbossily, Z. Kallien, R. Chafle, K.A. Fraser, M. Afrasiabi and B. Klusemann	2421
Prediction of Strip Width Deviation in Hot Strip Roughing Mills Based on Machine Learning Regression	
D. Ewen, J. Seitz, S. Kallabis, R. Franke, J. Denker, L. Lackmann and B. Kühlenkötter	2428
Multi-Objective Bayesian Optimization of Dual-Phase Steel Microstructures for Minimal Damage Initiation	
I. Biermann, N. Fehleemann, M. Hribsek and S. Münstermann	2440

Algebraic Hierarchical Graph Neural Networks for Forming Simulation of Thermoplastic Composite Materials	
T. Würth, N. Freymuth, J. Mitsch, P. Dahlinger, T. Hoang, G. Neumann and L. Kärger	2450
Explainable Machine Learning and 3D Visualization for Rotary Tube Bending: Expert Evaluation of a Web-Based Tool	
A. Yazdani, J. Knoche, B. Engel and K. Van Laerhoven	2462
Investigation of Code Optimization Strategies for Enhancing the Performance of Static Recrystallization Cellular Automata Models	
M. Sitko, S. Sitarz and Ł. Madej	2477
Parameter Optimization and Data-Driven Soft-Sensor Framework for Torque Prediction in Bobbin-Tool Friction Stir Welding of AA2024	
F. Nouira, L. Bergmann, F.E. Bock, G. Bouattour, M. Pacchione and B. Klusemann	2487
Long Short-Term Memory to Predict the Quality Parameters in the Hot Rolling Process	
T. Majumder, N. Thakare, H. Brüggemann, E. Scharifi and J. Lian	2499
AI-Based Predictions of Forming Effects for Enhanced Crash Simulation	
I. Lepenies	2510
Residual Learning-Based Synthetic Data for Hybrid Metamodeling in the Stamping of an Automotive Door Panel	
L. Muñiz, J. Trinidad, J. Ramirez de Okariz, E. García and L. Galdos	2520
Robust and Feature-Aware Arbitrary Lagrangian-Eulerian Method for Material Forming Applications	
J.O. Garcia, Z.J.R. Alves, U. Ripert and C. Beraudo	2529
Graph Neural Network for Draw-in Prediction in Sheet Metal Stamping	
H. Wang, T. Ahn, L. Huang, S.C. Oh, L. Huang, A. Ilinich, S. Dev and J.W. Yoon	2539
A Bayesian Data Assimilation Framework for Characterizing Recrystallization in Steels	
B. Jamshidi, J. Havinga and T. van den Boogard	2547
Predicting Lateral Flow in Hot Sheet Metal Rolling Using Symbolic Regression	
D.L. Mederos, A. Hashemzadeh, A. Cometa, C. Soyarslan, F. Bock, T. van den Boogard and B. Klusemann	2558
Physics-Informed Recurrent Neural Networks with Kinematic Constraints for Large Deformation Metal Forming	
F. Munzone, J. Hazrati, W. Hakvoort, R. van Tijum and T. van den Boogard	2571
An Ai-Based Approach to Developing a Microstructural Model for Multi-Stage Hot Deformation Processes	
D. Tretyakov, N. Biba, V. Belugin, A. Gartvig, A. Shitikov and S. Stebunov	2583
Accelerating Microstructural Evolution Simulations in DIGIMU® through a Front-Tracking Lagrangian Solver: Implementation and Validation in AISI 304L Stainless Steel	
F. Jaime, T. Sourisseau, P. De Micheli and M. Bernacki	2593
Study on the Apparent Friction Coefficient between a Deformable and a Rough Rigid Body under Large Sliding	
R.B. Wojciechowski, M.C. Oliveira and D.M. Neto	2605
Using Kolmogorov-Arnold Networks for Discrepancy Modeling of Lateral Flow in Hot Rolling of Steel Slabs	
A. Hashemzadeh, F. Bock, A. Cometa, C. Soyarslan, B. Klusemann and T. van den Boogard	2615
Modelling Deformation Mechanisms Decomposition, Separation and Compaction in Mechanical Joining Processes of Fiber Reinforced Thermoplastics on Meso Scale	
B. Gröger, J. Gerritzen, A. Hornig and M. Gude	2626
Combined Experimental and Simulation-Based Approach for Optimizing Roll Forming of Pipes for Hydrogen Infrastructure	
M.M. Pandey, A. Rautenstrauch, A. Kunke and T. Clausmeyer	2634

MS13: Non-Conventional Processes

Mechanical Performance of Incrementally Formed Flax Fiber-Reinforced Polypropylene Caps	
A. Formisano, L. Boccarusso, D. de Fazio, G. Irace and M. Durante	2649

Hybrid Hemp/Carbon Fiber Reinforced Composites: Manufacturing, Mechanical Behaviour and Environmental Assessment D. de Fazio, I. Bianchi, L. Boccarusso, M. Durante, C. Mignanelli, M. Panico, F. Pinto and M. Simoncini	2658
Modulated Pulsed Electrochemical Machining of Tungsten Carbide-Cobalt: An Experimental Study According to DIN SPEC 91399 A. Thielecke, P. Clauß, G. Meichsner, P. Damm, G. Jungblut, M. Schäfer and M. Hackert-Oschätzchen	2673
Deep Learning-Based Quality Classification of Cold Spray Coatings with Explainable Feature Analysis A.S. Perna, D. Rossi, A. Auriemma Citarella, D. de Fazio, F. De Marco, L. Di Biasi, M. Durante, G. Tortora and A. Viscusi	2683
Mining Critical Raw Materials from Waste Printed Circuit Boards by Thermo-Mechanical Disassembly A. Proietti, D. Bellisario, L. Iorio, D. Noqra, G. Patrizii, F. Quadrini and L. Santo	2694
Increasing Strength of Recycled Materials by Fiberglass Pulverization and Powder Direct Molding F. Quadrini, D. Bellisario, A. Proietti, L. Iorio, D. Noqra, G. Patrizii and L. Santo	2701
Preliminary Comparative Assessment of Hole Quality and Geometrical Tolerances in AM-Built and CNC-Drilled PLA Components M. Panico, G. Di Bella, M. Durante, M. Chairi, A. Langella and L. Boccarusso	2709
Evaluation of Anti-Fouling Behavior of Silver Nanocomposites Made by Nano-Coating Fragmentation L. Iorio, L. Santo, D. Bellisario, A. Proietti, D. Noqra, G. Patrizii and F. Quadrini	2723
Classification and Detection Method for Discharges in Electrical Discharge Machining through Unsupervised Learning P. Damm, O. Bederitzky, J. Vogel, A. Riefer, P. Plänitz, C. Lerez, G. Meichsner and M. Hackert-Oschätzchen	2731
Shape Memory Behavior of 3D-Printed Biomedical Polyurethane with Room Temperature Transition D. Bellisario, L. Iorio, A. Proietti, D. Noqra, G. Patrizii, F. Quadrini and L. Santo	2742
Analysis of Connection Geometries for Segmented Stator Cores Machined with Laser Beam Cutting F. Hoffmann, P. Plänitz, A. May, F. Winkler, M. Barth, S. Majcherek and M. Hackert-Oschätzchen	2752
Concurrent Effect of Laser Texturing and Resin Pre-Coating on the Performance of CFRP Single Lap Joints G. Parodo, L. Sorrentino, S. Turchetta and G. Moffa	2760
Estimation of the Lateral Gap in PECM: A Case Study on Tool Steel S390 R. Petermann, G. Meichsner, P. Clauß, S. Nickel and M. Hackert-Oschätzchen	2769
Enabling the Reuse of Single-Lap Adhesive-Bonded Joints through Laser Cleaning and Texturing V. Siciliani, M. Benvenuto, C. Mandolino, B. Reggiani and L. Orazi	2780
Beading as a Stabilising Element for Thin Wooden Panels R. Förster, A. Loth, J. Rösler and J. Hornig	2793
Unconventional Recycling of Aeronautical Ground Carbon Fiber Composite Wastes P. Russo, F. Napolitano, F. Quadrini and D. Bellisario	2805
Influence of Variable Radius Die Geometry on Tube Bending: A Finite Element Parametric Study A. Aslanidis, J. Reuter and B. Engel	2815
Electrodeposited Metallic Coatings as a Manufacturing Route to Enhance the Durability of NdFeB Magnets F. Scherillo, A.S. Perna and A. Viscusi	2827
Study of the Effect of Foam Substrate Material on Hydrophobic Coating Efficiency A. Baxevani, E. Lamprou, F. Stergioudi and N. Michailidis	2833
Design and Manufacturing of Complex Geometry PEEK Component through Fused Filament Fabrication N. Burattini, L. Bottini, D. Corapi and A. Boschetto	2845
Origami-Inspired Design for Manufacture of Composite Parts S. Navaratnarajah, V.K. Maes, M. Schenk and J. Kratz	2859

Development of an Initial FEM Framework to Model Particle-Substrate Contact in Fluidized Bed Finishing of L-PBF Parts A. Viscusi, A. El Hassanin and A. Squillace	2867
Surface Roughness Control in Incoloy 800HT via Laser Engraving Parameters E. Nikolidakis, P. Karmiris-Obratański, E.L. Papazoglou, L. Fatyga and A.P. Markopoulos	2874
Biomaterials' Surface Functionalization by High Frequency Micropatterning Embossing on PEEK Samples M. Magro, L. Filice, M. Perrelli, D. Mundo, F. Moscato and F. Gagliardi	2882
Non-Conventional Method of Evaluation of the Abrasion Resistance of a Polymeric Material Using a Hole Enlargement Process by Abrasion R.G. Hobjălă, R. Mititelu, V. Ermolai, Ș. Jureschi, I. Surugiu, V. Țisari, M. Coteata and L. Slătineanu	2890
Evaluating the Performance of Composite Tubes Drawn from Hybrids of Aluminum, Steel, and Carbon Fiber J. Buhl and L.I. Besong	2899
Non-Conventional Recycling Process of Hemp/Carbon Hybrid Laminates via Thermo-Mechanical Disassembly L. Boccarusso, D. Bellisario, A. Canneva, D. de Fazio, M. Durante, F. Quadrini and L. Santo	2907

MS14: Polymer Processing and Thermomechanical Properties

Numerical Multiphysics CFD Modelling of Porosity Evolution in Thermoset Prepreg Microstructures A.L. Briard, R. D'Elia, F. Berthet, A. Cheruet and F. Schmidt	2919
Thermoforming as Rapid Prototyping Strategy of Fishing Lures A. Loth, R. Förster and J. Rösler	2929
Influence of Surface Finish and Energy Director on Ultrasonic Welding Process of PAEK/Metal Hybrid Structures A. Korycki, J.D. Beguin, F. Chabert and C. Garnier	2941
Interfacial Welding of Two Different Reinforced Thermoplastics via TACOMA K. Vrettos, S. Le Corre, J.L. Bailleul and E. Bertevas	2952
Development of a New Production Process for Thermally Conductive Resin for Additive Manufacturing Using mSLA Process P. Müller, D. Kehret and S. Junk	2962
3D-Printed Pyrography Using PLA/Wood Filaments F. Comino, J.A. Martínez-Sánchez, A. Pellegrini and R. Spina	2971
Thermal Crystallization Kinetics of PET, RPET and PEF for Sustainable Packaging E. Gargadennec, Y.M. Luo, E. Monteiro and L. Chevalier	2979
Prediction of Temperature and Moisture Concentration in Autoclave-Cured Epoxy Resin Using Physics-Informed Neural Networks W.O. Pedruzzi, I.F. Tosi, W.P.M. Quiroz, R. D'Elia, J.C.S. Dutra and W.B. da Silva	2990
Meshless Transient Thermal Modeling of Polymer Composite Curing with Exothermic Heat Generation I.F. Tosi, W. Pedruzzi, W.P.M. Quiroz, R. D'Elia, J.C.S. Dutra and W. da Silva	3001
Material Characterization and Constitutive Modeling of PMMA for the Numerical Simulation of Vacuum Forming Process H. Choi, M. Baek, Y.N. Kwon, D. Kim, D. Jeong and Y.I. Jeong	3009
Analysis of Large Deformation Characteristics and Formability of PMMA M.J. Baek, Y.N. Kwon, D. Jeong, D. Kim, Y.I. Jeong and H. Choi	3016
From Deposition Sequence to Mechanical Response: A Macroscale Process Simulation of Material Extrusion M.E. Di Nardo, P. Russo and P. Carlone	3024
Bio-Composites for Additive Manufacturing Study of the Mechanical Properties F. Comino, J.A. Martínez-Sánchez, M. Zaza, S. Campanelli and R. Spina	3037
Multi-Objective Optimization of Injection-Molded Components for Defect Reduction and Warpage Minimization K. Oubellaouch, R. Pelaccia, G. Zaniboni, V. Siciliani and B. Reggiani	3044

Determination of Gelation Zone Position in Reactive Thermoplastic Pultrusion by Analysis of Heating Power Consumption	
M. Wilhelm, C. Schelleis, G. Zeeb and F. Henning	3058
Thermal Transient Modelling and Experimental Validation of Hybrid Polymer-Steel Moulds for Micro-Injection Moulding	
G. Zaniboni, V. Basile, R. Pelaccia, R. Surace, K. Oubellaouch, F. Modica, L. Orazi, G. Rotella, L. Filice and I. Fassi	3068

MS15: Sustainability on Material Forming

Electroplasticity for Sustainable Metal Forming: A Comparative Energy Assessment	
L. Benvenuto, E. Cozzolino, A. Testa, C. Mandolino, A. Simeone, E. Lertora, L. Settineri and A. Astarita	3081
Environmental Impact Assessment of Ti6Al4V Chips Recycling Using Shear Assisted Processing and Extrusion (ShAPE)	
P. Hosseini and J.R. Duflou	3089
Processability of Recycled Polypropylene for More Sustainable Pellet-Based 3D Printing	
D. Peymani and M. Strano	3101
Reuse of Fiber Reinforced Polymer Waste in MSLA 3D Printing: Mechanical Properties and Sustainability Assessment	
I. Bianchi, M. Di Pietro, A. Forcellese, C. Mignanelli, M. Simoncini and T. Verdini	3108
Investigation of Microstructure Evolution during AA6082 Chips Recycling through Friction Consolidation	
U. Aziz, U.F.H. Suhuddin, L. Rath, L.F. Schröder, V. Schmidt and B. Klusemann	3119
Climate Change Impact of Innovative Structural Aluminium Reinforced Concrete, a Case Study in Norway	
A.L. Tabosa da Silva, A.D. La Rosa, G. Ringen and X. Ma	3127
Sustainability-Driven Business Model in Mold Manufacturing: A Multi-Criteria Comparison between Conventional and Additive Technologies	
F. Borda, V. Basile, F. Gagliardi and L. Filice	3138
Green Hydrogen vs Conventional Energy Sources: A LCA Case Study of Aluminum Casting	
I. Bianchi, P. Forcellese, G. Fratini, T. Lamberti, T. Mancina and M. Simoncini	3149
Overcoming Copper Limitations in Scrap Recycling via Twin-Roll Casting	
D. Czempas, J. Lian and D. Bailly	3158
Recycling of Plastic Waste by Integrating Extrusion and Additive Manufacturing Techniques: Lessons Learned from RELIVE Project	
P. Carlone, M.E. Di Nardo, R. Mele, F. Borda, F. Gagliardi, F. Napolitano and P. Russo	3168
A Novel One-Shot Forming Process Integrating Hot Form Quench (HFQ) of High-Strength Aluminium for Fibre–Metal Laminate (FML) Panel Parts	
C. Gao, H. Wu, B. Blackman and N. Li	3179
On the Effect of Electric-Pulsed Treatments on the Formability and Sustainability of Titanium Alloy Reshaping	
E. Cozzolino, D. de Fazio, P. De Sio and A. Astarita	3186
Productivity and Quality Trade-Offs in Aluminum Extrusion: Towards Circularity Tolerant Process Windows	
Y. Solomon, D. Hemyari and S.A. Grammatikos	3197
Comparing Different Sheet Metal Forming Processes for Reshaping Purposes	
A. Piccininni, G. Ingarao, L. Barcellona, R. Puleo, A. Cusanno, F. Micari and G. Palumbo	3206
Material Transition by Friction Induced and Continuous Solid-State Recycling of Aluminum Scrap	
S. Gabsa and W. Homberg	3218
Comparative Life Cycle Assessment of Industrial Zn and Zn-Al Hot-Dip Galvanizing Processes for Steel Wire Production	
M. Carta, P. Buonadonna, S. D'Angelo, P. de Berardinis, G. Derosas and M. El Mehtedi	3226
Ready for Circular Manufacturing? Metal Forming Processes Studies and Research Agenda	
P. Frohn-Sörensen, A. Aslanidis, M. Geueke and B. Engel	3236

Increasing Sustainability in Open-Die Forging by Means of Process Adaption and Innovation

D. Bailly, M. Gouverneur and J. Lian

3250

MS16: Advanced Metal Casting

Neural Network-Based Machine Learning Model for Spatiotemporal Prediction of Temperature and Fraction Solid in Low-Pressure Sand Casting

A. Ktari, S. Housni, J. Bourgeois and M. El Mansori

3263

Assessment of Natural Gas-Hydrogen Fuel Blends for Industrial Melting Furnaces in Secondary Aluminium Production

C. Michaelis, E. Koslowski, A. Giese, C. Schwarz and M. Hackert-Oschätzchen

3273

Potential and Advantages of Vertical Strip Casting for Production of High-Strength Aluminum-Magnesium Alloys

S. Häner, D. Czempas, E. Scharifi, D. Bailly and J. Lian

3283

RSM-Based Approach to Optimize the Gating System in High Pressure Die Casting

M. Campanella, A. Piccininni, A. Cusanno, P. Guglielmi, G. Palumbo, M. Duraccio and F. Lembo

3294

Effect of Interfacial Heat Transfer on the Solidification Behaviour of Numerically Simulated High-Pressure Die Casting Process

N. Balasubramani and M. El Mansori

3306

Additive Manufacturing for Advanced and Functional Tooling of Dies Used in High-Pressure Die Casting Processes

S.H. Rajendran, N. Balasubramani and M. El Mansori

3317

Digital Manufacturing of One-Off Replacement Components Using Reverse Engineering and Rapid Low-Pressure Sand Casting: Dimensional Evaluation and Key Challenges

A. Ktari, D. Lu, G. Ainsworth and M. El Mansori

3334

Exploiting Artificial Neural Networks for Digital Twins in Sand Casting

E. Pischinas, E. Stathatos and G.C. Vosniakos

3343

Cleaner Melt Transfer of Recycled Aluminium Alloys: Simulation-Guided Launder Baffle Design for Aerospace-Grade Structural Castings

T. Sivarupan, A.M.V. Jayaraman Palanivel, K. Georgarakis, J. Forde, B. Shaw, K. Salonitis and M. Jolly

3353

Numerical and Experimental Design of a Step HPDC Mould for Process–Microstructure Correlation in Lightweight Component

A. Morri, B. Reggiani, R. Squatrito, M. da Silva, G. Zaniboni and L. Donati

3364