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122	Determining Friction and Flow Stress of Material during Forging	Dixit, Uday Shanker (1); Kumar, Vikash (1); Petrov, Pavel A (2); Saprykin, B. Yu (2)	1: Indian Institute of Technology Guwahati, India; 2: Moscow Polytechnic University
135	Higher Productivity In Forming High-alloyed Steel By Temperature Insensitive Friction Behavior	Aha, Bernd (1); Hettich, Daniel (1); Veldhuis, Mark (2); Filzek, Jan (3)	1: Zeller+Gmelin GmbH & Co. KG, Schlossstrasse 20, D-73054 Eislingen, Germany; 2: Philips High Tech Campus 5, 5656AE, Eindhoven, The Netherlands; 3: FILZEK TRIBOtech, Weingartenstraße 31, D-64367 Mühltal, Germany
136	Contact pressure, sliding velocity and viscosity dependent friction behavior of lubricants used in tube hydroforming processes	Galdos, Lander; Otegi, Nagore; Mendiguren, Joseba; Trinidad, Javier; Saenz de Argandoña, Eneko	Advanced Material Forming Processes research group, Mondragon University
142	Influence of the sheet metal Seebeck coefficient on wear detection based on thermoelectric measurements	Wu, Yutian; Chen, Chen; Wang, Chengjun; Groche, Peter	Technische Universität Darmstadt, Germany
144	Contact pressure and sliding velocity ranges in sheet metal forming simulations	Cillaurren, Joseba; Galdos, Lander; Sanchez, Mario; Zabala, Alaitz; Sáenz de Argandoña, Eneko; Mendiguren, Joseba	Mondragon University, Spain
164	Temperature Induced Friction Increase in Friction Test and Forming Demonstrator for Sheet Metal Forming	Filzek, Jan; Keil, Daniel; Holger, Schroeder	FILZEK TRIBOtech, Germany
201	Deformation due to sliding of single and woven carbon tows in dry and epoxy-lubricated conditions	Smerdova, Olga; Benchekroun, Omar; Brunetiere, Noel	Institut Pprime, CNRS, ISAE-ENSMA, Université de Poitiers
243	Effects of Lubrication, Specimen Preparation and Tool Coating on the Friction Behaviour of Commercially-Pure Titanium at Elevated Temperature	Roszak, Jacob Aleksander (1); Rosochowski, Andrzej (2); Rosochowska, Malgorzata (1)	1: Advanced Forming Research Centre, United Kingdon; 2: University of Strathclyde, United Kingdom

118	Towards numerical prediction of flow-induced fiber displacements during wet compression molding (WCM)	Poppe, Christian Timo (1); Albrecht, Fabian (1,2); Krauß, Constantin (1); Kärger, Luise (1)	1: Karlsruhe Institute of Technology (KIT), Institute for Vehicle System Technology (FAST), Lightweight Technology, Germany; 2: Fraunhofer Institute for Chemical Technology, Polymer Engineering Department, Joseph-von-Fraunhofer-Str. 7, 76327 Pfinztal, Germany
133	Material Modelling of Fabric Deformation in Forming Simulation of Fiber-Metal Laminates – A Review on Modelling Fabric Coupling Mechanisms	Werner, Henrik Oliver (1,2); Schäfer, Florian (1); Henning, Frank (1,3); Kärger, Luise (1)	1: Karlsruhe Institute of Technology (KIT), Institute of Vehicle System Technology, Karlsruhe, Germany; 2: Karlsruhe Institute of Technology (KIT), Institute of Applied Materials, Karlsruhe, Germany; 3: Fraunhofer Institute for Chemical Technology (ICT), Pfinztal, Germany
147	Intra-ply shear characterization of unidirectional fiber reinforced thermoplastic tape using the bias extension method	Brands, Dennis (1,2); Grouve, Wouter (1); Wijskamp, Sebastiaan (2); Akkerman, Remko (1,2)	1: Chair of Production Technology, Faculty of Engineering Technology, University of Twente, P.O. box 217, 7500 AE Enschede, The Netherlands; 2: ThermoPlastic composites Research Center (TPRC), P.O. box 770, 7500 AT Enschede, The Netherlands
158	On the origin of start-up effects in ply-ply friction for UD fiber-reinforced thermoplastics in melt	Pierik, E.R. (1,2); Grouve, W.J.B. (1); Wijskamp, S. (2); Akkerman, R. (1,2)	1: Faculty of Engineering Technology, Chair of Production Technology, University of Twente, Enschede, The Netherlands; 2: ThermoPlastic composites Research Center (TPRC), Enschede, The Netherlands
159	An approach of modelling of the compaction of flax-carbon hybrid stack preforms	VIVET, Alexandre (1); TOSSOU, Eric (1); GEHRING, Florian (1); MARESCHAL, Olivier (2)	1: Normandie Univ, ENSICAEN, UNICAEN, CEA, CNRS, CIMAP, 14000 Caen, France; 2: Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, 14000 Caen, France
166	Virtual parameter identification of the forming behaviour of discontinuous fiber-reinforced thermoplastic composite sheets	Kabala, Philipp; Ossowski, Tim; Hürkamp, André; Beuscher, Jan; Dröder, Klaus	Institute of machine tools and production technology (IWF), Technische Universität Braunschweig, Germany
168	Measurement of fiber wrinkles and shear angles of DoubleDome forming parts	Graef, Jasmin; Weiß, Björn; Engel, Bernd	University of Siegen, Germany

193	Multi-scale design, prototyping and validation testing of a composite anti roll bar	Eyckens, Philip (1); Boulay, Emilie (2); Cavaliere, Giulio Pietro (3); Stroobants, Jan (1); Kot, Adam (4,5)	1: Flanders Make, CodesignS, Belgium; 2: DRiV, Belgium; 3: KU Leuven, MTM, Belgium; 4: CompDesE GmbH, Germany; 5: Institut für Textiltechnik at RWTH Aachen University, Germany
208	Fused Filament Fabrication of ONYX-based Composites coated with Aluminum powders: a preliminary analysis on feasibility and characterization	Perna, Alessia Serena (1,3); Astarita, Antonello (1); Borrelli, Domenico (4); Caraviello, Antonio (4); Carrino, Luigi (1); Delloro, Francesco (2); Della Gatta, Roberta (1); Lomonaco, Patrizio (2); Papa, Ilaria (1); Sansone, Raffaele (4); Squillace, Antonino (1); Viscusi, Antonio (1)	1: Department of Chemical, Materials and Industrial Production Engineering, University of Naples Federico II,; 2: Département Mécanique et Matériaux (MINES ParisTech); 3: University of Bergamo; 4: Sophia High tech s.r.l.
218	The effect of reinforcement, fibre, and matrix on the forming behaviour of continuous fibre reinforced thermoplastic composites	Veenstra, Simon (1,2); Wijskamp, Sebastiaan (2); Rosić, Bojana (1); Akkerman, Remko (1,2)	1: University of Twente, Netherlands, The; 2: TPRC Thermoplastic Composites Research Center, Netherlands, The
222	Prediction of forming effects in UD-NCF by macroscopic forming simulation – Capabilities and limitations	Kärger, Luise (1); Galkin, Siegfried (1,2); Kunze, Eckart (3); Gude, Maik (3); Schäfer, Bastian (1)	1: Karlsruhe Institute of Technology (KIT), Institute of Vehicle System Technology (FAST), Karlsruhe, Germany; 2: Federal Waterways Engineering and Research Institute (BAW), Karlsruhe, Germany; 3: Technical University Dresden, Institute of Lightweight Engineering and Polymer Technology (ILK), Dresden, Germany
227	Influence of automated fiber placement parameters on thermoplastic composite blanks used on stamp forming process	Vernejoux, Camille (1,2); Fischer, Xavier (1,2); Deseur, Simon (3); Duc, Emmanuel (4)	1: ESTIA, Institute of Technoloy, F-64210 Bidart, France; 2: Univ.Bordeaux, I2M, F-33000 Bordeaux, France; 3: Compositadour, Parc Technocité, F-64100 France; 4: Univ.Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, F-63000 Clermont-Ferrand, France
253	A Sequential Approach for Simulation of Thermoforming and Squeeze Flow of Glass Mat Thermoplastics	Dörr, Dominik (1); Ivanov, Stanislav (1); Gergely, Ryan (2); Henning, Frank (1,3,4); Straatman, Anthony G. (1); Hrymak, Andrew (1)	1: University of Western Ontario (UWO), Faculty of Engineering, London, Ontario, Canada; 2: GM Research and Development, General Motors, Warren, MI, USA; 3: Karlsruhe Institute of Technology (KIT), Institute of Vehicle System Technology (FAST), Karlsruhe, Germany; 4: Fraunhofer Institute for Chemical Technology,

			Department for Polymer Engineering, Pfinztal, Germany
255	Potential and Challenges of a Solid-Shell Element for the Macroscopic Forming Simulation of Engineering Textiles	Schäfer, Bastian (1); Dörr, Dominik (2,3); Kärger, Luise (1)	1: Karlsruhe Institute of Technology (KIT), Institute of Vehicle System Technology (FAST), Karlsruhe, Germany; 2: University of Western Ontario (UWO), Faculty of Engineering, London, Ontario, Canada; 3: SIMUTENCE GmbH, Karlsruhe, Germany
262	Residual stresses developed in thermoplastic composites during laser-assisted tape laying	El Bayssari, Anna Maria (1); Jacquemin, Frédéric (1); Peron, Mael (1); Barasinski, Anais (2); Daghia, Federica (3); Guillon, Damien (4)	1: Université de Nantes Institut de Recherche en Génie Civil et Mécanique (GeM), 58 Rue Michel Ange, 44600 Saint Nazaire, France; 2: Chaire Composites E2S Université de Pau et des Pays de l'Adour, 64053 Pau Cedex 9; 3: Université Paris-Saclay, ENS Paris-Saclay, CNRS LMT - Laboratoire de Mécanique et Technologie , 4 avenue des Sciences, 91190, Gif-sur Yvette, France; 4: Cetim, Centre technique des industries mécaniques, Nantes, France
265	Evaluation of the crosslinking steps of an unsaturated polyester resin during the infusion process of polymer-matrix composites using embedded PZT transducer	HARIZI, Walid; TULOUP, Corentin; ABOURA, Zoheir	Université de Technologie de Compiègne, France
272	Challenges in modelling the forming of unidirectionnal HiTape® reinforcements	Durif, Bastien (1,2); Moulin, Nicolas (1); Drapier, Sylvain (1); Bouquerel, Laure (2); Blais, Maxime (2)	1: Mines Saint-Etienne, University of Lyon, CNRS, UMR 5307 LGF, SMS Center, 158 Cours Fauriel, 42023 Saint-Etienne, France; 2: Hexcel Reinforcements, Route des Nappes CS20027, 38630 Les Avenières, France
277	Modeling and simulation of the robotic layup of fibrous preforms for liquid composite molding	Esperto, Vitantonio (2); Gambardella, Antonio (1); Pasquino, Germana (3); Tucci, Fausto (1); Durante, Massimo (2); Carlone, Pierpaolo (1)	1: University of Salerno, Italy; 2: University of Naples Federico II, Italy; 3: Universitas Mercatorum, Italy

286	Macro-meso scale simulations of 3D woven composite reinforcements during the forming process	WANG, JIE (1); WANG, PENG (2); HAMILA, NAHIENE (3); BOISSE, PHILIPPE (1)	1: LaMCoS, INSA de Lyon, F-69621 Lyon, France; 2: LPMT, ENSISA, F-68000 Mulhouse, France; 3: IRDL - UMR CNRS 6027 – ENIB, Brest, France
292	Investigation of the formability behaviour of optimized tufted and un-tufted multi-layer carbon preforms during the stamping process	Gnaba, Imen (1); Soulat, Damien (1); Legrand, Xavier (1); Wang, Peng (2)	1: University of Lille, ENSAIT, GEMTEX, France; 2: University of Upper Alsace, ENSISA, LPMT, France
294	Draping modelization of stitched composite reinforcements	Huang, Jin (1); Hamila, Nahiène (2); Boisse, Philippe (1)	1: Université de Lyon, LaMCoS CNRS, INSA-Lyon, F-69621, France; 2: ENI Brest, UMR CNRS 6027, IRDL, Brest, France
297	Effects of Thickness Changes and Friction during the Thermoforming of Composite Sheets	White, Kari D; Campshure, Blake T; Sherwood, James A	University of Massachusetts Lowell, United States of America
298	Friction Characterization of UHMWPE Cross-Ply Composite Sheets for Thermoforming Processes	Campshure, Blake Thomas; White, Kari D; Sherwood, James A	University of Massachusetts Lowell, United States of America
301	Analysis of the mechanical composite properties of ii-chamber variations in the closed injection pultrusion process	Strauss, Sebastian Johannes; Wilhelm, Frederik; Boysen, Simon; Senz, Andreas; Rilli, Niko	Fraunhofer Gesellschaft für angewandte Forschung e.V., Germany
313	Manufacturing and metallization of hybrid thermoplastic-thermoset matrix composites	Parmar, Hetal (1); Gambardella, Antonio (1); Perna, Alessia Serena (2); Viscusi, Antonio (2); Della Gatta, Roberta (2); Tucci, Fausto (1); Astarita, Antonello (2); Carlone, Pierpaolo (1)	1: University of Salerno, Italy; 2: University of Naples Federico II, Italy
317	Qualification of an Epoxy Resin System for Use in Secondarily Formable CFRP Rebars	Müller-Pabel, Michael; Wohlfahrt, Daniel; Geller, Sirko; Gude, Maik	Technische Universität Dresden, Germany
327	Visco-thermo-elastic Simulation Approach For Prediction of Cure-induced Residual Stresses in Fiber Reinforced Composites	Müller, Jonas (1); Müller-Pabel, Michael (2); Niklas, Lorenz (1); Gröger, Benjamin (2); Gerritzen, Johannes (2); Gude, Maik (2); Hopmann, Christian (1)	1: RWTH Aachen, Germany; 2: TU Dresden, Germany
332	Analysis of spring-in deformation in L-shaped profiles pultruded at different pulling speeds: mathematical simulation and experimental results	Vedernikov, Alexander (1); Safonov, Alexander (1); Tucci, Fausto (2); Carlone, Pierpaolo (2); Akhatov, Iskander (1)	1: Skolkovo Institute of Science and Technology, Russian Federation; 2: University of Salerno, Italy
367	A Comprehensive Review of Commercial Process Simulation Software for Sheet Moulding Compound	Qian Cheng, Connie; Deshpande, Abhay; Jesri, Mona; Groves, Richard; Reynolds, Neil; Kendall, Ken	University of Warwick, United Kingdom

398	Development of an experimental approach to study preforming mesoscopic defects of woven fabrics	Shanwan, Anwar (1); Allaoui, Samir (2); Gillibert, Jean (1); Hivet, Gilles (1)	1: University of Orléans - Laboratory of Mechanics (LaMé - EA 7494), France; 2: University of Reims - Institute of Thermics, Mechanics and Materials (ITheMM – EA 7548), France
405	Investigation of the forming behavior of carbon fiber yarns on microscopic scale with detailed statistical volume elements	Engelfried, Mathias; Middendorf, Peter	University of Stuttgart, Germany

MS03 EXTRUSION AND DRAWING -4 papers

149	Numerical assessment of large hexagonal seamless steel tube extrusion feasibility	Habans, Dylan (1); Mocellin, Katia (1); Montmitonnet, Pierre (1); Sornin, Denis (2); Olier, Patrick (2)	1: MINES Paris, PSL, CEMEF, CNRS UMR 7635, Sophia Antipolis, France; 2: Université Paris-Saclay, CEA, Service de Recherches Métallurgiques Appliquées, 91191, Gif-sur-Yvette, France
157	Analysis and optimization of cooling channels performances for industrial extrusion dies	Pelaccia, Riccardo (1); Negozio, Marco (2); Reggiani, Barbara (1); Donati, Lorenzo (2); Tomesani, Luca (2)	1: University of Modena and Reggio Emilia, Italy; 2: University of Bologna, Italy
160	Extrusion and characterization of aluminum/graphene composites	Negendank, Maik (1); Rabi Faezi, Hamidreza (1); Mueller, Soeren (1); Ovsianytskyi, Oleksandr (2); Goerke, Oliver (2); Gurlo, Aleksander (2)	1: TU Berlin, Extrusion Research and Development Center, Germany; 2: TU Berlin, Chair of Advanced Ceramics Materials, Germany
263	Numerical analysis of plastic die deformation during high temperature copper extrusion	Lechner, Stefan; Nitschke, Renè; Mueller, Soeren	Extrusion Research & Development Center, Technische Universität Berlin, Germany

MS04 FORGING AND ROLLING – 12 papers

112	Numerical and experimental simulation of shrinkage porosity closure during hot rolling of bars	Pondaven, Corentin (1,2); Langlois, Laurent (1); Erzar, Benjamin (2); Bigot, Régis (1)	1: Arts et Métiers, France; 2: ABS Centre Métallurgique ACM
171	Multivariable regression and Gradient Boosting algorithms for energy prediction in the radial-axial ring rolling (RARR) process	Mirandola, Irene (1); Berti, Guido (1); Caracciolo, Roberto (1); Lee, Seungro (2); Kim, Naksoo (2); Quagliato, Luca (2)	1: University of Padova, Italy; 2: Sogang University, South Korea
202	A computational method for pass design of the four-roll rolling process for sizing of round sections	Overhagen, Christian	University of Duisburg-Essen, Germany
236	Initiation of Dynamic Recrystallization of As-Cast N08028 Alloy	Mora, Elena (1); Navarro, Aitor (2); Silveira, Elena (3); Poletti, Maria Cecilia (4); Mendiguren, Joseba (1); Hurtado, Iñaki (1)	1: Mondragon Unibertsitatea, Spain; 2: Tubacex Inovation AIE, Spain; 3: Tecnalia, Spain; 4: Graz University of Technology, Austria
247	Numerical investigations on the influence of the weld surface and die geometry on the resulting tensile stresses in the joining zone during an extrusion process	Behrens, Bernd-Arno; Duran, Deniz; Uhe, Johanna; Matthias, Tim	Leibniz Universität Hannover, Germany
261	On the evolution of microstructure and mechanical properties of type 316 austenitic stainless steel during ingot to billet conversion process	Paquette, Arthur (1); Rahimi, Salah (1); Violatos, Ioannis (1); Langlois, Laurent (2); Dumont, Christian (3); Blaizot, Jérôme (3); Rosochowska, Malgorzata (1); Bigot, Régis (2)	1: Advanced Forming Research Centre (AFRC), University of Strathclyde, 85 Inchinnan Drive, Inchinnan, Renfrewshire PA4 9LJ, United Kingdom; 2: Arts et Metiers Institute of Technology, Université de Lorraine, LCFC, HESAM Université, F-57070 Metz, France; 3: Aubert & Duval - Usine des Ancizes, Les Ancizes, 63770, France
267	Adjusting Mechanical Properties of Dies Produced by Ausforming	Behrens, Bernd-Arno; Brunotte, Kai; Petersen, Tom; Ostermeyer, Corvin; Till, Michael	Institute of Forming Technology and Machines, Germany
356	Methods for online measurement and control of section deviations during hot rolling of wire rod and bars	Overhagen, Christian; Braun, Rolf; Deike, Rüdiger	University of Duisburg-Essen, Germany
371	Comparison of different sensor technologies to monitor a forging process	Durand, Camille (1); Freund, Ludovic (1); Baudouin, Cyrille (1); Bigot, Regis (1); Guérin, Jean Dominique (2)	1: Arts et Métiers Institute of Technology, France; 2: Université polytechnique Hauts de France CNRS, LAMIH UMR 8201, F-59313

384	Modelling of an induction heating process and resulting material distribution of a hybrid semi-finished product after impact extrusion	Bernd-Arno, Behrens; Wester, Hendrik; Schäfer, Stefan; Johanna, Uhe; Büdenbender, Christoph	Institute of Forming Technology and Machines, Germany
411	Numerical evaluation of forging process designs of a hybrid co-extruded demonstrator consisting of steel and aluminium	Behrens, Bernd-Arno; Wester, Hendrik; Petersen, Tom; Uhe, Johanna; Büdenbender, Christoph; Peddinghaus, Julius; Chugreeva, Anna	Institute of Forming Technology and Machines, Leibniz Universität Hannover, Germany
426	Numerical Investigation of a New Production Method for Face Gearings Incorporating Material Predistribution – Pin-to-Gear Method	Weiss, Andre; Liewald, Mathias	Institute for Metal Forming Technology (IFU), University of Stuttgart

MS05 INNOVATIVE JOINING BY FORMING TECHNOLOGIES – 19 papers

114	Strength of self-piercing riveted joints with conventional rivets and rivets made of high nitrogen steel	Uhe, Benedikt (1); Kuball, Clara-Maria (2); Merklein, Marion (2); Meschut, Gerson (1)	1: Paderborn University, Germany; 2: Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
119	A method for three-dimensional modelling of the shear-clinching process	Han, Daxin; Yang, Chen; Meschut, Gerson	Laboratory for Material and Joining Technology, Paderborn University, Germany
152	Development of a novel adaptive joining technology employing Friction-Spun Joint Connectors (FSJC)	Wiens, Eugen; Homberg, Werner; Wischer, Christian	Paderborn University, Germany
154	Combined-Cycle Corrosion Testing of Steel/6000 Series Aluminum Alloys Joined by Friction Welding	jin, jianchen; iizuka, takashi	kyoto institute of technology, Japan
174	Joint point loadings in car bodies - The influence of manufacturing tolerances and scatter in material properties	Martin, Sven; Tröster, Thomas	Paderborn University, Chair of Automotive Lightweight Design, Germany
189	Numerical Prediction of the Stress State in CFRP Induced by Setting a Blind Rivet Nut	Van de Velde, Arne; Coppieters, Sam; Debruyne, Dimitri	KU Leuven, Department of Materials Engineering
207	Friction Stir Welding of dissimilar aluminum-steel joints for the shipbuilding industry	Campanella, Davide; Buffa, Gianluca; Fratini, Livan	University of Palermo, Italy
224	Bonding of similar AA3105 aluminum alloy by Accumulative Roll Bonding process	El Mehtedi, Mohamad (1); Lai, Daniele (1); Almehtedi, Rayane (2); Carta, Mauro (1); Buonadonna, Pasquale (1); Aymerich, Francesco (1)	1: DIMCM, Università degli studi di Cagliari, Italy; 2: Beirut Arab University, Lebanon
268	Joining of Sheets with Tubes by Electrohydraulic Forming	Langstädtler, Lasse (1,2); Herrmann, Marius (1,2,3); Schenck, Christian (1,2,3); Kuhfuss, Bernd (1,2,3)	1: bime, Bremen Institute for Mechanical Engineering, Badgasteiner Str. 1, Bremen, 28359, Germany; 2: MAPEX Center for Materials and Processing, Postfach 330440, 28334 Bremen, Germany; 3: University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany

306	Material characterisation methods for a tumbling self-piercing riveting process	Wituschek, Simon; Lechner, Michael	Institute of Manufacturing Technology, Germany
319	Joining titanium by means of ceramic adhesives	Scherillo, Fabio (1); El Hassanin, Andrea (1); Silvestri, Alessia Teresa (1); Liguori, Barbara (1); Aprea, Paolo (1); Di Martino, Daniela (2); Contaldi, Vincenzo (2)	1: University of Naples 'Federico II', Italy; 2: MBDA Italia SpA, Italy
330	Influence of rivet length on joint formation on self-piercing riveting process considering further process parameters	Kappe, Fabian; Bielak, Christian; Sartisson, Vadim; Bobbert, Mathias; Meschut, Gerson	Paderborn University, Laboratory for material and joining technology (LWF)
342	Further development of a numerical method for analyzing the load capacity of clinched joints in versatile process chains	Bielak, Christian Roman; Böhnke, Max; Bobbert, Mathias; Meschut, Gerson	LWF, University of Paderborn
358	Deformation and anchoring of AA2024-T3 rivets within thin printed circuit boards	Farah Antunes Vilas Boas, Maria Clara (1,2); Rodrigues, Camila Fernanda (1); Blaga, Lucian-Attila (1); Fernandez dos Santos, Jorge (1,3); Klusemann, Benjamin (1,4)	1: Helmholtz-Zentrum Geesthacht, Germany; 2: Federal University of Sao Carlos, Brazil; 3: Technische Universität Ilmenau, Germany; 4: Leuphana Universität Lüneburg, Germany
364	Development of General data-based Process Models for Self-Pierce Riveting	Jäckel, Mathias; Kropp, Thomas; Falk, Tobias	Fraunhofer Institute for Machine Tools and Forming Technology IWU, Germany
368	Clinching in In-situ CT - Experimental Study on Suitable Tool Materials	Köhler, Daniel; Kupfer, Robert; Troschitz, Juliane; Gude, Maik	TU Dresden, Germany
372	Local damage behaviour of friction stir-welded AA6061 /AA7075 under fatigue and static loading	Dimov, Nicolas (1,2,3); Sapanathan, Thaneshan (1); Simar, Aude (1); Charkaluk, Eric (2); Benoist, Julien (3)	1: UCLouvain, Institute of Mechanics, Materials and Civil Engineering, IMAP, 1348 Louvain-la-Neuve, Belgium; 2: Ecole Polytechnique, Laboratoire de Mécanique des Solides (LMS), 91120 Palaiseau, France; 3: Thales Global Services, 19 Avenue Morane Saulnier, 78140, Vélizy-Villacoublay, France
391	Segregation of alloying elements on the hot tear formation in friction melt bonding of Al/steel joints	Sapanathan, Thaneshan; Ryelandt, Sophie; Bettanini, Alvise M.; Jacques, Pascal J.; Simar, Aude	UCLouvain, Institute of Mechanics, Materials and Civil Engineering, IMAP, 1348 Louvain-la-Neuve, Belgium

406	Experimental Investigation of Damage and Failure Mechanisms of Polymer-Metal Joints assembled by Self-Piercing Riveting	AMRO, Elias (1,2); KOUADRI-HENNI, Afia (1,2)	1: National Institute of Applied Sciences of Rennes, France; 2: ROMAS, Laboratory of Digital Sciences of Nantes (LS2N), UMR CNRS 6004

MS06 INTEGRATED MANUFACTURING AND SUSTAINABILITY – 5 papers

116	Warm Stamping of Micro-Pillared Aluminum Heatsink with Use of Plasma-Printed Dies	Aizawa, Tatsuhiko (2); Morita, Hiroshi (1)	1: Nano Film Coat, Japan; 2: Surface Engineering Design Laboratory, SIT
216	Prediction of the Impact Behavior of Bio-hybrid Composites Using Finite Element Method	Mocerino, Davide (1); Boccarusso, Luca (1); Rizzo, Francesco (2); De Fazio, Dario (1); Pinto, Fulvio (2); Durante, Massimo (1); Langella, Antonio (1); Meo, Michele (2)	1: Univerity of Naples Federico II, Italy; 2: University of Bath
239	Innovative measurements of stress superposed steel strip for straightening machines	Bader, Fabian (1); Bathelt, Lukas (2); Djakow, Eugen (1); Homberg, Werner (1); Henke, Christian (2); Trächtler, Ansgar (2)	1: Paderborn University, Germany; 2: Fraunhofer IEM, Germany
295	Comparative life cycle assessment of carbon fiber reinforced composite components for automotive industry	Forcelesse, Archimede (1); Mancia, Tommaso (1); Simoncini, Michela (2); Gentili, Serena (1); Marconi, Marco (3); Vita, Alessio (1); Nardinocchi, Alessia (4); Castorani, Vincenzo (4)	1: Univpm, Italy; 2: UniEcampus, Italy; 3: Unitus, Italy; 4: HP Composites spa, Italy
305	On the elastoplastic behavior of friction stir welded tailored blanks for single point incremental forming processes	Tucci, Fausto (1); Andrade-Campos, António (2); Thuillier, Sandrine (3); Carlone, Pierpaolo (1)	1: Department of Industrial Engineering, University of Salerno, Via Giovanni Paolo II, 132, Fisciano (SA), Italy; 2: Center for Mechanical Technology and Automation, Dep. Mechanical Engineering, University of Aveiro,Portugal; 3: Univ. Bretagne Sud, UMR CNRS 6027, IRDL, F-56100 Lorient, France

MS07 MACHINING AND CUTTING – 19 papers

108	Validation of a multi-scale Ti-6Al-4V drilling model by means of thermomechanical field measurements	Bonnet, Camille (1); Pottier, Thomas (1); Landon, Yann (2); Bouzid, Abdallah (2)	1: Institut Clément Ader (ICA) ; Université de Toulouse ; CNRS, IMT Mines Albi, INSA, ISAE-SUPAERO, UPS ; Campus Jarlard, F-81013 Albi, France; 2: Institut Clément Ader (ICA) ; Université de Toulouse ; CNRS, IMT Mines Albi, INSA, ISAE-SUPAERO, UPS ; Espace Clément Ader, 31400 Toulouse, France
113	On the effects of Burnishing process on tribological surface resistance of additively manufactured steel	Saffioti, Maria Rosaria (1); Sanguedolce, Michela (1); Rotella, Giovanna (2); Filice, Luigino (1)	1: University of Calabria, Italy; 2: University of Salento, Italy
138	Waspaloy orthogonal hard machining simulation, a comparison among different rheological models	Rinaldi, Sergio; Umbrello, Domenico	University of Calabria, Italy
140	Analysis of the Tool Stick-Out Influence on Machining Chatter	BARBEITO, Asier (1); ARRAZOLA, Pedro-José (1); BONDE, Klaus (2)	1: Mondragon University, Spain; 2: Danish Advanced Research Centre, Denmark
167	Cryogenic Machining To Enhance Surface Finish Of A Biomedical Grade Ultra-High-Molecular Weight Polyethylene	Bertolini, Rachele; Ghiotti, Andrea; Bruschi, Stefania	University of Padova, Department of Industrial Engineering, via Venezia 1, 35131, Padova, Italy
173	Tool Geometry Analysis for Plunge Milling of Lead-Free Cu-Zn-Alloys	Baier, Stefan (1); Kokozinski, Lukas (1); Schraknepper, Daniel (1); Bergs, Thomas (1,2)	1: Laboratory for Machine Tools and Production Engineering (WZL) at RWTH Aachen University, Aachen, Germany; 2: Fraunhofer Institute for Production Technology IPT, Aachen, Germany
181	Experimental Investigation of Shear Cutting Techniques for Fibre-Reinforced-Plastics-Metal-Laminates	Reichel, Vicky; Beuscher, Jan; Hürkamp, André; Dröder, Klaus	TU Braunschweig, Germany
219	Finite element modelling of the Taylor impact test in 3D with the Coupled Eulerian-Lagrangian method	Ducobu, François (1); Demarbaix, Anthonin (1); Pantalé, Olivier (2)	1: Machine Design and Production Engineering Lab, Faculty of Engineering, University of Mons, Belgium; 2: Laboratoire Génie de Production (LGP), Université de Toulouse, INP-ENIT, Tarbes, France

238	Development and experimental validation of a macroscopic analytical model to generate metal-FRP stacks drilling cutting force and torque	BEUSCART, Thomas (1); ARRAZOLA, Pedro-José (2); RIVIERE-LORPHEVRE, Edouard (1); DUCOBU, François (1)	1: Machine Design and Production Engineering Lab - Faculty of Engineering - University of Mons, Place du parc 20, 7000 Mons, Belgium; 2: Escuela Politécnica Superior de Mondragon Uniberstitatea, Loramendi 4, 20500, Mondragon, Spain
245	Influences of Cutting Speed and Material Constitutive Models on Chip Formation and their Effects on the Results of Ti6Al4V Orthogonal Cutting Simulation.	KUGALUR PALANISAMY, Nithyaraaj (1); RIVIERE LORPHEVRE, Edouard (1); ARRAZOLA ARRIOLA, Pedro José (2); DUCOBU, François (1)	1: University of Mons, Faculty of Engineering, Machine Design and Production Engineering Lab - Belgium; 2: Mondragon University, Faculty of Engineering, Mechanical and Manufacturing Department - Spain
269	Punching with a slant angle - cutting surface quality	Liewald, Mathias; Schenek, Adrian	Institute for Metal Forming Technology, Germany
281	A Tool Tuning Approximation Method: Exploration of the System Dynamics and its Impact on Milling Stability when Amending Tool Stickout	Bertelsen, Nikolai (1); Alphinas, Robert (2); Ørskov, Klaus B. (3)	1: Danish Advanced Manufacturing Research Center (DAMRC); 2: Aarhus University, Denmark; 3: Danish Advanced Manufacturing Research Center (DAMRC)
284	Experimental analysis on machining parameters and cooling conditions affecting surface integrity of Ti6Al4V	Saffioti, Maria Rosaria (1); Sanguedolce, Michela (1); Rotella, Giovanna (2); Umbrello, Domenico (1)	1: Department of Mechanical, Energy and Management Engineering, University of Calabria, Rende, CS 87036, Italy; 2: Department of Engineering for Innovation, University of Salento, Lecce, LE 73100, Italy
321	Liquid CO2 Assisted Machining of Martensitic Stainless Steel with TiAlSiN PVD Coated Tools	Drobnič, Matej (1,2); Pušavec, Franci (2); Čekada, Miha (1)	1: Jožef Stefan Institute, Department of Thin Films and Surfaces, Jamova 39, SI-1000 Ljubljana, Slovenia; 2: University of Ljubljana, Faculty of Mechanical Engineering, Laboratory for Machining, Aškerčeva 6, SI-1000 Ljubljana, Slovenia
333	Multi-scale characterization of material and surface integrity of Inconel 718 when milling by Abrasive Water Jet process: Context of repair application	Cano Salinas, Lorena (1); Moussaoui, Kamel (1); Hejjaji, Akshay (1); Salem, Mehdi (2); Hor, Anis (1); Zitoune, Redouane (1)	1: Institut Clément Ader, CNRS UMR 5312, 3 Rue Caroline Aigle, 31400 Toulouse, France; 2: Institut Clément Ader, CNRS UMR 5312, Campus Jarlard, 81013 Albi, France

338	Cutting Performance of Austenitic and Duplex Stainless Steels with Drills of three cutting edges	Marouvo, João (1,2); Ferreira, Pedro (1,2); Simões, Fernando (1,2,3)	1: Polytechnic Institute of Coimbra - Coimbra Institute of Engineering, Portugal; 2: IIA - Institute of Applied Research - Polytechnic Institute of Coimbra, Portugal; 3: CEMMPRE - Center for Mechanical Engineering, Materials and Processes - University of Coimbra, Portugal
347	Finite element simulation of tool wear in machining of nickel-chromium-based superalloy	Abeni, Andrea (1); Cappellini, Cristian (2); Attanasio, Aldo (1)	1: Università degli Studi di Brescia, Italy; 2: Free University of Bolzano, Italy
379	Cutting Force in Milling of Additive Manufacturing AISI 420 Stainless Steel	Tamura, Shoichi (1); Matsumura, Takashi (2)	1: Ashikaga University, Japan; 2: Tokyo Denki University, Japan
407	Characterization of wear modes in orthogonal milling of 15-5PH stainless steel	David, Tom (1); Methon, Grégory (1,2); M'Saoubi, Rachid (2); Girinon, Mathieu (3); Rech, Joël (1); Courbon, Cédric (1)	1: University of Lyon, ENISE, LTDS UMR 5513, F-42023, Saint-Etienne, France; 2: R&D Material and Technology Development Seco Tools AB, SE-73782 Fagersta, Sweden; 3: CETIM, 52 avenue Félix-Louat, 60300 Senlis, France

MS09 NEW AND ADVANCED NUMERICAL STRATEGIES FOR MATERIAL FORMING -10 papers

109	Motion profile calculation for freeform bending with moveable die based on tool parameters	Werner, Matthias Konrad; Maier, Daniel; Scandola, Lorenzo; Volk, Wolfram	Technical University of Munich, Germany
120	Modelling real contact areas caused by material straining effects in sheet metal forming simulation	Essig, Peter (1); Liewald, Mathias (2); Burkart, Maximilian (1); Beck, Maxim (2)	1: Mercedes-Benz AG; 2: Institute for Metal Forming Technology, University of Stuttgart
126	Artificial Intelligence Based Space Reduction of Structural Models	Ghnatios, Chady (1); El Haber, Georges (2); Duval, Jean Louis (2); Ziane, Mustapha (2); Chinesta, Francisco (3)	1: NDU; 2: ESI; 3: ENSAM
127	Hybrid Twins: a highway towards a performance-based engineering Part I: Advanced Model Order Reduction enabling Real-Time Physics	CHAMPANEY, Victor (1); SANCARLOS, Abel (1); CHINESTA, Francisco (1); CUETO, Elias (2); GONZALEZ, David (2); ALFARO, Iciar (2); GUEVELOU, Simon (3); DUVAL, Jean-Louis (3); CHAMBARD, Anne (3); MOURGUE, Philippe (3)	1: Arts et Métiers Institute of Technology, France; 2: University of Zaragoza, Spain; 3: ESI Group, France
131	Hybrid Twins. Part II: Real-time data-driven modelling	Cueto, Elias (1); Gonzalez, David (1); Badias, Alberto (1); Chinesta, Francisco (2); Hascoet, Nicolas (2); Duval, Jean-Louis (3)	1: Universidad de Zaragoza, Spain; 2: Arts et Métiers Institute of Technology. France; 3: ESI Group. France
291	Modeling of thin sheet forming processes by combining solid-shell finite element with isotropic elastoviscoplastic model. Application to magnetic pulse forming processes	Mahmoud, Mohamed; Bay, François; Pino Muñoz, Daniel	Computational Solid Mechanics Research Group, MINES ParisTech, PSL - Research University, CEMEF - Centre for material forming
293	A non-intrusive model order reduction approach for multi-physics parametrized problems - Application to induction heating process	Derouiche, Khouloud (1,2); Chinesta, Francisco (1); Daoud, Monzer (2); Traidi, Khalil (3)	1: Arts et Metiers Institute of Technology. 151 Boulevard de l'Hôpital, 75013 Paris, France; 2: French Technological Research Institute for Materials, Metallurgy and Processes (IRT- M2P). 4, rue Augustin Fresnel, 57070 Metz, France; 3: Safran Tech. Rue des jeunes Bois, 78117 Châteaufort, France
296	Evaluation of mechanical property predictions of refill Friction Stir Spot Welding joints via machine learning regression analyses on DoE data	Bock, Frederic E. (1); Paulsen, Tino (2); Brkovic, Nikola (2); Rieckmann, Lennart (2); Kroeger, Dennis (2); Wolgast, Dominik (2); Zander, Philip (2); Suhuddin, Uceu F.H. (1); dos Santos, Jorge F. (1); Klusemann, Benjamin (1,2)	1: Institute of Materials Mechanics, Department of Solid State Materials Processing, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany; 2: Institute of Product and Process Innovation,

			Leuphana University of Lüneburg, Lüneburg, Germany
339	Modelling of thermally supported clinching of fibre-reinforced thermoplastics: Approaches on mesoscale considering large deformations and fibre failure	Gröger, Benjamin; Hornig, Andreas; Hoog, Arne; Gude, Maik	Technische Universität Dresden, Germany
395	Investigation of the anisotropic behaviour of laser heat treated aluminium blanks	Piccininni, Antonio (1); Lattanzi, Attilio (2); Rossi, Marco (2); Palumbo, Gianfranco (1)	1: Politecnico di Bari, Italy; 2: Università Politecnica delle Marche, Italy

MS10 NON-CONVENTIONAL PROCESSES – 15 papers

178	Robot-assisted surface treatment strategies of AA6014 sheet metal for accumulative roll bonding	Zettl, Bastian; Merklein, Marion	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
190	Analysis of the extreme temperature's effect on the low-velocity impact behaviour and damage evolution in sandwich components	Papa, Ilaria; Boccarusso, Luca; Mocerino, Davide; Langella, Antonio	Department of Chemical, Materials and Production Engineering, University of Naples Federico II, P.le Vincenzo Tecchio 80, 80125 Naples, Italy
203	Considerations on the influence of the tool/sheet contact conditions for incremental forming of Niobium sheets	Formisano, Antonio (1); Astarita, Antonello (1); Boccarusso, Luca (1); Durante, Massimo (1); Garlasché, Marco (2); Langella, Antonio (1)	1: Università degli Studi di Napoli Federico II, Italy; 2: CERN –European Centre for Nuclear Research, Geneva, Switzerland
206	A computer vision-based, in-situ springback monitoring technique for bending of large profiles	Ha, Taekwang (1,2); Ma, Jun (1); Blindheim, Jørgen (1); Welo, Torgeir (1); Ringen, Geir (1); Wang, Jyhwen (2)	1: Norwegian University of Science and Technology, Norway; 2: Texas A&M University, USA
209	Wire electrical discharge machinability and load-bearing capacity of ATZ-WC composite ceramics	Olivier, Marcel (1); Heß, Raphael (1); Gommeringer, Andrea (2); Kern, Frank (2); Herrig, Tim (1,3); Bergs, Thomas (1,3)	1: Laboratory for Machine Tools and Production Engineering WZL of RWTH Aachen University, Germany; 2: Institute for Manufacturing Technologies of Ceramic Components and Composites (IFKB), University of Stuttgart, Germany; 3: Fraunhofer Institute for Production Technology IPT, Germany
212	Directing the material flow and form filling through a multi-axis forming process	Wonnenberg, Birk; Gabriel, Felix; Dröder, Klaus	Technische Universität Braunschweig, Institute of Machine Tools and Production Technology, Germany
213	Corrugated Structure Reinforcing Aluminum Foam	Durante, Massimo; Boccarusso, Luca; Formisano, Antonio; De Fazio, Dario; Viscusi, Antonio; Carrino, Luigi	University of Naples Federico II - UNINA, Italy
214	Efficient Prediction of Real-Time Forming Forces in Flexible Stretch Bending	Ma, Jun; Welo, Torgeir; Ringen, Geir	Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology, Trondheim, 7491, Norway
215	Recyclability Process of Gypsum Reinforced with Hemp Fabrics: Impact and Flexural Behaviour	Boccarusso, Luca; Mocerino, Davide; Durante, Massimo; Iucolano, Fabio; Memola Capece Minutolo, Fabrizio; Langella, Antonio	Department of Chemical Materials and Production Engineering, University of Naples Federico II

264	Analysis of laser cut slots on different thickness steel plate	Olaru, Sergiu Constantin; Coteaţă, Margareta; Nagit, Gheorghe; Hrituc, Adelina; Dodun, Oana; Slatineanu, Laurenţiu	"Gheorghe Asachi" Technical University of Iasi, Romania
300	On the fatigue crack growth resistance of aluminum matrix composites reinforced by shape memory alloys	Gomes Affonseca Netto, Nelson (1); Zhao, Lv (1,2); Charkaluk, Eric (3); Hosdez, Jérôme (4); Simar, Aude (1)	1: Université Catholique de Louvain, Louvain la Neuve, Belgium, Institute of Mechanics, Materials and Civil Engineering, IMAP; 2: Huazhong University of Science and Technology, Wuhan, China, Department of Mechanics; 3: École Polytechnique, Palaiseau, France; 4: Univ. Lille, CNRS, Centrale Lille, Laboratoire de Mécanique, Multiphysique et Multiéchelle (LaMcube) UMR 9013, 59000 Lille, France
311	Analysis of Sub-processes Specific to Hybrid Non-conventional Machining Methods	Schulze, Hans-Peter; Kröning, Oliver	Leukhardt Schaltanlagen Systemtechnik Magdeburg, Germany
362	Electromagnetic Embossing of Optical Microstructures with High Aspect Ratios in Thin Aluminum Sheets	Heidhoff, Julian (1,3,4); Beckschwarte, Björn (2,4); Riemer, Oltmann (1,3); Schönemann, Lars (1,3); Herrmann, Marius (2,3,4); Schenck, Christian (2,3,4); Kuhfuss, Bernd (2,3,4)	1: Leibniz Institute for Materials Engineering, Germany; 2: Bremen Institute for Mechanical Engineering, Germany; 3: Center for Materials and Processing, Germany; 4: University of Bremen, Germany
381	Fracture Toughness and Tribological Properties of Cemented Carbides Machined by Sinking Electrical Discharge Machining	Petersen, Timm (1); Küpper, Ugur (1,2); Herrig, Tim (1,2); Klink, Andreas (1); Bergs, Thomas (1,2)	1: Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Germany; 2: Fraunhofer Institute for Production Technology IPT, Steibachstrasse 17, 52074 Aachen, Germany
422	Anisogrid lattice cylinders made of thermoplastic composite under buckling loading	Iorio, Leandro (1); Bellisario, Denise (2); Gallo, Nicola (1); Papa, Claudia (1); Regi, Marco (1); Santoro, Daniele (1); Quadrini, Fabrizio (1); Santo, Loredana (1)	1: University of Rome 'Tor Vergata'; 2: Universitas Mercatorum

MS11 OPTIMIZATION AND INVERSE ANALYSIS IN FORMING – 13 papers

153	Optimization of chemical composition of high-strength structural steels for achieving mechanical property requirements	Babachenko, Oleksandr (1); Kononenko, Hanna (1); Snigura, Iryna (1); Togobytska, Nataliya (2)	1: Z.I. Nekrasov Iron and Steel Institute of NAS of Ukraine; 2: University of Applied Sciences Berlin (HTW), Germany
156	Thermal design methodology in hybrid manufacturing process of High Performance Thermoplastics Composites.	Reyes Rodriguez, Enrique (1,2); Tardif, Xavier (1); Sobotka, Vincent (2); Bailleul, Jean-Luc (2); Allanic, Nadine (3)	1: IRT Jules Verne, Chemin du Chaffault, 44340 Bouguenais, France.; 2: Nantes université, CNRS, Laboratoire de thermique et énergie de Nantes, LTeN, UMR 6607, F-44000 Nantes, France.; 3: Laboratoire de Génie des Procédés–Environnement–Agro-alimentaire (GEPEA) UMR CNRS 6144, Nantes,France
187	Deep Neural Networks as Surrogate Models for Time-efficient Manufacturing Process Optimisation	Zimmerling, Clemens; Seuffert, Julian; Schindler, Patrick; Kärger, Luise	Karlsruhe Institute of Technology, Institute of Vehicle System Technology, Germany
192	Independent validation of generic specimen design for inverse identification of plastic anisotropy	Zhang, Yi; Coppieters, Sam; Gothivarekar, Sanjay; Van de Velde, Arne; Debruyne, Dimitri	Department of Materials Engineering, KU Leuven, 3001 Leuven, Belgium
194	Development and identification of the cellular automata phase transformation model	Sitko, Mateusz (1); Pietrzyk, Maciej (1); Kuziak, Roman (2); Szeliga, Danuta (1); Chang, Yuling (3); Bleck, Wolfgang (3); Madej, Lukasz (1)	1: AGH University of Science and Technology, Poland; 2: Łukasiewicz Research Network, Institute for Ferrous Metallurgy; 3: RWTH Aachen University
221	Numerical study of the square cup stamping process: a stochastic analysis	Pereira, A.F.G.; Ruivo, M.F.; Oliveira, M.C.; Fernandes, J.V.; Prates, P.A.	University of Coimbra, Centre for Mechanical Engineering, Materials and Processes (CEMMPRE), Department of Mechanical Engineering, Polo II – Pinhal de Marrocos, 3030-788 Coimbra, Portugal
234	Problem of parameters identification for stochastic internal variable material models	Klimczak, Konrad (1); Oprocha, Piotr (1); Kusiak, Jan (1); Szeliga, Danuta (1); Morkisz, Paweł (1); Przybyłowicz, Paweł (1); Czyżewska, Natalia (1); Pietrzyk, Maciej (1); Kuziak, Roman (2)	1: AGH University of Science and Technology, al. Mickiewicza 30, 30-059 Kraków, Poland; 2: Research Network ŁUKASIEWICZ – IMŻ, ul. K. Miarki12, 44-100 Gliwice, Poland
237	Effect of input variables uncertainty in free tube hydroforming process	KHALFALLAH, Ali; Prates, Pedro A; Fernandes, Jose V	Universidade de Coimbra, Portugal

242	Parameters' confidence intervals evaluation for heterogeneous strain field specimen designs by using digital image correlation	Maček, Andraž; Urevc, Janez; Starman, Bojan; Halilovič, Miroslav	Faculty of Mechanical Engineering, University of Ljubljana
258	Design of heterogeneous interior notched specimens for material mechanical characterization	Conde, Mariana; Andrade-Campos, A. Gil; Oliveira, Miguel G.; Martins, João P.	Mechanical department, TEMA R&D unit, Universidade de Aveiro, Portugal
352	Prediction and assessment of skid line formation during deep drawing of sheet metal components by using FEM simulation	Cyron, Patrick Andreas; Liewald, Mathias; Riedmüller, Kim Rouven; Le, Thanh Lich	Institute for Metal Forming Technology, University of Stuttgart, Germany
363	Design of a fuzzy controller to prevent wrinkling during rotary draw bending	Borchmann, Linda (1); Schneider, Dominique (2); Engel, Bernd (1)	1: Universität Siegen, Germany; 2: HJS Emission Technology GmbH & Co. KG, Germany
373	On the Optimisation Efficiency for the Inverse Identification of Constitutive Model Parameters	Oliveira, M.G. (1,2); Martins, J.M.P. (1,2); Coelho, B. (1,2); Thuillier, S. (2); Andrade-Campos, A. (1)	1: Centre for Mechanical Technology and Automation (TEMA), Department of Mechanical Engineering, University of Aveiro, 3180-193, Aveiro, Portugal; 2: Univ. Bretagne Sud, UMR CNRS 6027, IRDL, F-56100, Lorient, France

MS12 POLYMER PROCESSING AND THERMOMECHANICAL PROPERTIES – 14 papers

124	Effect of PEEK degradation on commingled fabrics consolidation	FEUILLERAT, LISA (1); DE ALMEIDA, OLIVIER (1); FONTANIER, JEAN-CHARLES (2); SCHMIDT, FABRICE (1)	1: Institut Clément Ader, Université de Toulouse, CNRS UMR 5312, IMT Mines Albi, UPS, INSA, ISAE-SUPAERO, Campus Jarlard, 81013 Albi, France; 2: Institut Français du Textile et de l'Habillement, 14 Rue des Reculettes, 75013 Paris, France
125	Estimation of Stress-Strain behavior of polyethylene terephthalate (PET) at different strain rates and temperatures by Artificial Neural Network under simultaneous stretch scenario	Teng, Fei; Menary, Gary; Malinov, Savko; Yan, Shiyong	Queen's University Belfast, United Kingdom
134	A Three-Dimensional Thermo-Chemical Characterization During The Whole Curing Cycle Of A Carbon/Epoxy Prepreg	SFAR ZBED, Rima; SOBOTKA, Vincent; LE CORRE, Steven	Université de Nantes, CNRS, Laboratoire de thermique et énergie de Nantes, LTeN, UMR 6607, F-44000 Nantes, France
143	Temperature and contact pressure effects on the adhesion development of high performance thermoplastic composites	Avenet, Julien (1,2); Le Corre, Steven (1); Bailleul, Jean-Luc (1); Levy, Arthur (1)	1: Université de Nantes, CNRS, Laboratoire de Thermique et Energie de Nantes, LTeN, ULR 6607, F-44000 Nantes, France; 2: IRT Jules Verne, Chemin de Chaffault, 44340 Bouguenais
176	Generation and homogenization of foamed polymer RVEs: Microstructure-mechanical properties relationship	Bouvard, Jean-Luc (1); Feng, Shaoheng (1); Alexis, Florent (1); Bernacki, Marc (1); Pino Munoz, Daniel (1); Agazzi, Alban (2); Le Goff, Ronan (2); Drouel, Guillaume (2)	1: Mines Paris-PSL, France; 2: Innovation-Plasturgie-Composites (IPC)
200	Modeling the reactive PA6 flow for LCM processes	Han, William (1); Govignon, Quentin (1); Cantarel, Arthur (2); Samuel, Cédric (3); Schmidt, Fabrice (1)	1: Institut Clément Ader (ICA) , Université de Toulouse ; CNRS, IMT Mines Albi, INSA, ISAE-SUPAERO, UPS , Campus Jarlard, 81013 Albi; 2: Institut Clément Ader (ICA) , Université de Toulouse ; CNRS, IMT Mines Albi, INSA, ISAE-SUPAERO, UPS, 1 rue Lautréamont, 65016 Tarbes; 3: Department of Polymers and Composites Technology & Mechanical Engineering, IMT Lille Douai, 41 rue Charles Bourseul, 59508 Douai, France

280	3D printing of PLA and PMMA multilayered model polymers: an innovative approach toward a better controlling of “pellet multi-extrusion process”	Yousfi, Mohamed (1); Belhadj, Ahmed (1); Lamnawar, Khalid (1); Maazouz, Abderrahim (1,2)	1: Université de Lyon, INSA Lyon, CNRS, UMR 5223, Ingénierie des Matériaux Polymères, F-69621 Villeurbanne, France; 2: Hassan II Academy of Science and Technology, Rabat, Morocco
302	Rheology, tribology toward the investigation of small molecules migration in recycled agricultural waste multilayer films	Cabrera, Geraldine (1); Pichon, Gerard (2); Maazouz, Abderahim (1); Lamnawar, Khalid (1)	1: Univ Lyon, INSA Lyon, CNRS, IMP UMR 5223, Ingénierie des Matériaux Polymères, F-69621, Villeurbanne, France; 2: Groupe Barbier, St-Sigolène, France
303	Melt strengthening of polylactic acid and its blends: Shear and elongation rheological investigations of the forming process	Maazouz, Abderahim; Lamnawar, khalid	Univ Lyon, INSA Lyon, CNRS, IMP UMR 5223, Ingénierie des Matériaux Polymères, F-69621, Villeurbanne, France
331	Rapid Tooling for Injection Moulding Inserts	Farioli, Daniele (1); Strano, Matteo (1); Briatico Vangosa, Francesco (2); Zaragoza, Veronica Geraldine (3); Aicardi, Andrea (4)	1: Politecnico di Milano, Dipartimento di Meccanica, Via Giuseppe La Masa, 1, 20156, Milan, Italy; 2: Politecnico di Milano, Dipartimento di Chimica, Materiali e Ingegneria Chimica "Giulio Natta", Piazza Leonardo da Vinci, 32, 20133, Milan, Italy; 3: MUSP, Str. della Torre della Razza, Piacenza, 29122, Italy; 4: Ghepi, Via 8 Marzo, 5, Corte Tegge, 42025, Italy
353	Analysis of the sliding mechanics of NBR thread pattern	Spina, Roberto (1,2,3); Galantucci, Luigi Maria (1); Lavecchia, Fulvio (1); Cavalcante, Bruno (1,3); Doca, Thiago (4); De Luca, Cataldo (5)	1: Dip. di Meccanica, Matematica e Management, Politecnico di Bari, Italy.; 2: Istituto Nazionale di Fisica Nucleare (INFN) - Sezione di Bari, Italy; 3: Consiglio Nazionale delle Ricerche - Istituto di Fotonica e Nanotecnologie (CNR-IFN), Italy; 4: Dep.de Engenharia Mecânica, Faculdade de Tecnologia da Universidade de Brasília, Brazil; 5: Base Protection SRL Unipersonale, Italy
401	Relationship Between Crystallization, Mechanical and Gas Barrier Properties of Poly(ethylene furanoate) (PEF) in Multinanolayered PLA-PEF and PET-PEF Films	Guinault, Alain (1); Sollogoub, Cyrille (1); Messin, Tiphaine (1); Roland, Sébastien (1); Dole, Patrice (2); Anderer, Gilbert (3); Krawielitzki, Stefan (3); Grandmontagne, Anne (1); Julien, Jean-Mario (4); Loriot, Catherine (4); Vincelot, Thierry (4)	1: PIMM laboratory, UMR 8006, Paris, France; 2: CTCPA, Bourg en Bresse, France; 3: AVA Biochem, Zug, Switzerland; 4: Laboratoire national de métrologie et d’essais, Trappes, France

420	An innovative welding solution for polymer films in packaging: effect of process parameters	Tannous, Queen (1,2); BEREAUX, Yves (2); MOUSSEAU, Pierre (2); BARASINSKI, Anaïs (3); DETERRE, Rémi (3); MADEC, Yannick (2); FOURMAUX, Clément (2)	1: SEALESTER, France; 2: GEPEA, UMR CNRS 6144, IUT- Université de Nantes, France; 3: IPREM, CNRS UPPA 5254, Université de Pau et des Pays de l'Adour, France
424	Experimental investigation and optimization of thermal gradient by Infrared welding	Perrin, Henri; Senoussaoui, Noha-Lys; Leroy Dubief, Cécile; Vaudemont, Régis	LIST, Luxembourg

MS13 ADDITIVE MANUFACTURING – 39 papers

117	Contribution to process digitisation of cold forging processes using additive manufactured tools	Deliktas, Tahsin; Liewald, Mathias; Nezic, Nikola	Institute for Metal Forming Technology (IFU), University of Stuttgart, Germany
128	Advanced image analysis of thermoplastic filaments' viscous sintering kinetics: Contour fitting with a Lemniscate of Booth	Chaunier, Laurent (1); Réguerre, Anne-Laure (1); Leroy, Eric (2)	1: INRAE, BIA, UR 1268, F-44316, Nantes, France; 2: GEPEA, UMR CNRS 6144, F-44600 Saint Nazaire, France
137	Surface finish of Additively Manufactured Metals: biofilm formation and cellular attachment	Ginestra, Paola Serena (1); Riva, Leonardo (1); Ceretti, Elisabetta (1); Lobo, David (1); Mountcastle, Sophie (2); Villapun, Victor (2); Cox, Sophie (2); Grover, Liam (2); Attallah, Moataz (3); Addison, Owen (4); Sheperd, Duncan (5); Webber, Mark (6)	1: Department of Mechanical and Industrial Engineering, University of Brescia, Italy; 2: School of Chemical Engineering, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.; 3: School of Metallurgy and Materials, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.; 4: School of Dentistry, University of Birmingham, 5 Mill Pool Way, Edgbaston, Birmingham B5 7EG, UK.; 5: Department of Mechanical Engineering, University of Birmingham, 5 Mill Pool Way, Edgbaston, Birmingham B5 7EG, UK.; 6: School of Biosciences, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.
139	Processability of metal-filament through polymer FDM machine	Quarto, Mariangela; Carminati, Mattia; D'Urso, Gianluca; Giardini, Claudio; Maccarini, Giancarlo	Department of Management, Information and Production Engineering, University of Bergamo, Italy
141	Surface modification of additively manufactured parts by forming	Hafenecker, Jan (1,4); Kuball, Clara-Maria (1); Rothfelder, Richard (2,4); Schmidt, Michael (2,3,4); Merklein, Marion (1,3,4)	1: Institute of Manufacturing Technology (LFT), Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; 2: Institute of Photonic Technologies (LPT), Friedrich-Alexander-Universität Erlangen-Nürnberg, Konrad-Zuse-Germany; 3: Erlangen Graduate School in Advanced Optical Technologies (SAOT), Paul-, Germany; 4: Collaborative Research Center 814 – Additive Manufacturing, Germany

148	Data-driven Prediction of Temperature Evolution in Metallic Additive Manufacturing Process	Pham, T.Q.D (1); Hoang, T.-V. (2); Pham, T.Q. (3); Huynh, P.T. (1); Tran, X.V. (1); Fetni, S. (4); Duchêne, L. (4); Tran, H.S. (4); Habraken, Anne Marie (4)	1: Thu Dau Mot University, Vietnam; 2: RWTH-Aachen University, Germany; 3: Ton Duc Thang University, Vietnam; 4: University of Liège, Belgium
150	Experimental Investigation of Effect of Printing Direction and Surface Roughness on the Mechanical Properties of AlSi10Mg-alloy Produced by Selective Laser Melting	Vysochinskiy, Dmitry (1); Akhtar, Naureen (1); Nordmo, Tord (1); Strand, Mathias Rabjerg (1); Vyssios, Adrian (1); Bak, Morten Kollerup (2)	1: University of Agder, Norway; 2: Mechatronics Innovation Lab AS, Norway
161	Optimization of process-property relations of 3D printed ceramics using extrusion-based additive manufacturing	Farid, Muhammad Asad; Strano, Matteo; Rane, Kedarnath	Politecnico di Milano, Italy
169	Research Into The Effect Of The 3D-Printing Mode On Changing The Properties Of PETG Transparent Plastic	Petrov, Pavel (1); Agzamova, Diana (1); Pustovalov, Vladimir (1); Chmutin, Igor (1,2); Zhikhareva, Elena (1); Saprykin, Boris (1); Shmakova, Natalya (2)	1: Moscow Polytechnic University, Russian Federation; 2: JSC Technopark "Slava", Russian Federation
175	Experimental studies for the additive manufacturing of continuous fiber reinforced composites using UV-curing thermosets	Kunze, Eckart; Müller-Pabel, Michael; Weißenborn, Oliver; Luft, Ron; Faust, Johann; Geller, Sirko; Gude, Maik	Technische Universität Dresden, Institute of lightweight engineering and polymer technology, Germany
180	Differential Scanning Calorimetry Study of AlSi10Mg Alloy Processed by Laser Powder Bed Fusion	Delahaye, Jocelyn Nicolas (1); Habraken, Anne Marie (2); Mertens, Anne (1)	1: A&M, MMS, University of Liège, Quartier Polytech 1, Allée de la Découverte 9 (B52), B4000 Liège, Belgium; 2: UEE, MS2F-MSM, University of Liège, Quartier Polytech 1, Allée de la Découverte 9
182	Phase change driven adaptive mesh refinement in PFEM	Bobach, Billy-Joe; Falla, Romain; Boman, Romain; Vincent, Terrapon; Ponthot, Jean-Philippe	Uliège, Belgium
188	A methodology for mould conformal cooling channels optimization exploiting 3D printing.	Arrivabeni, Edoardo Battista (1); Tomasoni, Daniele (2); Giorleo, Luca (2); Barbato, Maurizio Claudio (1)	1: Scuola Universitaria professionale della svizzera italiana, Switzerland; 2: Università degli studi di Brescia, Italy
197	Milling Tool Optimization by Topology Optimization Technique	Tomasoni, Daniele; Giorleo, Luca; Ceretti, Elisabetta	University of Brescia, Italy
205	Influence of Implantation Period on Bioactivity on Surface of Ti-6Al-4V Implant Model Made by Selective Laser Melting	Kutsukake, Asuka (1); Seki, Azusa (2); Yoshida, Yoshinori (1)	1: Tokai National Higher Education and Research System; 2: HAMRI CO., LTD.

228	Element activation method and non-conformal dynamic remeshing strategy to model additive manufacturing	Laruelle, Cédric; Boman, Romain; Papeleux, Luc; Ponthot, Jean-Philippe	University of Liège, Department of Aerospace and Mechanical Engineering, Non-Linear Computational Mechanics group
229	Bonding between high-performance polymer processed by Fused Filament Fabrication and PEEK/carbon fiber laminate	Caprais, Isciane (1,2); Joyot, Pierre (1,2); Duc, Emmanuel (3); Deseur, Simon (4)	1: ESTIA Institue of Technology F-64210 Bidart, France; 2: I2M, Univ. Bordeaux F-33000 Bordeaux, France; 3: Univ. Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal F-63000 Clermont–Ferrand, France; 4: Compositadour Parc Technocité F-64100 Bayonne, France
232	Advanced computational modelling of metallic wire-arc additive manufacturing	Kovšca, Dejan; Starman, Bojan; Ščetinec, Aljaž; Klobčar, Damjan; Mole, Nikolaj	Faculty of Mechanical Engineering, University of Ljubljana
248	Spreading of Powders in Powder Bed Additive Manufacturing: an Experimental Approach	Lampitella, Valerio; Trofa, Marco; Astarita, Antonello; D'Avino, Gaetano	Universtity of Naples Federico II, Italy
249	Powder bed fusion modelling based on Discontinuous Galerkin formulation	Arbaoui, Larbi (1); Schrooyen, Pierre (1); Poletz, Nicolas (1); Hillewaert, Koen (2)	1: Cenaero, Belgium; 2: University of Liege, Belgium
250	Use of Laser Metal Deposition for launcher parts	JIMENEZ MENA, Norberto (1); DUFOUR, Philippe (2); GEORGES, Cedric (1); NUTAL, Nicolas (1); Brandao, Ana (3)	1: CRM group, Belgium; 2: SONACA Group, Belgium; 3: ESA-ESTEC, The Netherlands
251	Identification of AlSi10Mg matrix behavior by nanoindentation	Dedry, Olivier (1); Bouffioux, Chantal (2); Tran, Hoang Son (2); Santos Macias, Juan Guillermo (3); Habraken, Anne Marie (2); Mertens, Anne (1)	1: Science des Matériaux Métalliques, Université de Liège, Belgium; 2: Mécanique des Solides et des Matériaux, Université de Liège, Belgium; 3: Materials and Process Engineering, Université Catholique de Louvain, Belgium
254	Estimation of track dimensions obtained in Laser Metal Deposition-powder thanks to a semi-analytical model coupled to an Eulerian thermal simulation	Leroy-Dubief, Cécile; Poulhaon, Fabien; Joyot, Pierre	Univ. Bordeaux, ESTIA INSTITUTE OF TECHNOLOGY, I2M, UMR 5295, F-64210 Bidart, France.
256	Analysis for Understanding and Standardization of Additive Manufacturing Processes	Matschinski, Alexander (1); Osswald, Tim (2); Drechsler, Klaus (1)	1: Technical University of Munich, Germany; 2: University of Wisconsin-Madison, United States
271	Integrating Layer by layer manufacturing for the realization of polymer complex geometries with scanning devices: re-building by digital data	Bruni, Carlo (1); Greco, Luciano (2); Mancia, Tommaso (3); Pieralisi, Massimiliano (4)	1: Università Politecnica delle Marche, Italy; 2: Università Politecnica delle Marche, Italy; 3: Università Politecnica delle Marche, Italy; 4: Università Politecnica delle Marche, Italy

274	XPS and SEM characterization for powder recycling within 3d printing process	E. Gorji, Nima; O'Connor, Robert; Brabazon, Dermot	I-Form research centre, Dublin City University, Ireland
279	Silver and Copper nano-colloid generation via Pulsed Laser Ablation in Liquid: Recirculation nanoparticle production mode	Sreenilayam, Sithara Pavithran (1); McMann, Ronan (1); McCarthy, Éanna (1); Goodnick, Stephen (2); Freeland, Brian (1); Fleischer, Karsten (1); Bowden, Stuart (2); Honsberg, Christiana (2); Brabazon, Dermot (1)	1: I-Form, Advanced Manufacturing Research Centre, & Advanced Processing Technology Research Centre, School of Mechanical and Manufacturing Engineering, Dublin City University, Glasnevin, Dublin-9, Ireland; 2: Quantum Energy for Sustainable Solar Technology (QESST) Engineering Research Center, Arizona State University, Tempe AZ 85281, United States
285	Investigation of High-Rate Additive Manufacturing of Ti-6Al-4V via Laser Material Deposition	Hama-Saleh, Rebar (1); Yildirim, Kerim (2); Hemes, Susanne (3); Weisheit, Andreas (1); Häfner, Constantin Leon (1)	1: Fraunhofer-Institut für Lasertechnik, Germany; 2: Manufacturing Processes and Systems, Department of Mechanical Engineering, KU Leuven, Belgium; 3: Access e.V, Germany
288	On the Influence of Manufacturing Strategy of 3D-Printed Polymer Substrates on Cold Spray Deposition	Viscusi, Antonio (1); Astarita, Antonello (1); Borrelli, Domenico (2); Caraviello, Antonio (2); Carrino, Luigi (1); Della Gatta, Roberta (1); Lopresto, Valentina (1); Papa, Ilaria (1); Perna, Alessia Serena (1,3); Sansone, Raffaele (2); Squillace, Antonino (1)	1: Department of Chemical, Materials and Production Engineering, University of Naples Federico II, Piazzale V. Tecchio 80, 80125 Napoli, Italy; 2: Sòphia High Tech, Via Romani 228, 80048, Sant'Anastasia NA, Italy; 3: University of Bergamo, Bergamo, Italy
290	Manufacturing of aluminum coating on 3D-printed Onyx with Cold Spray technology	Della Gatta, Roberta (1); Astarita, Antonello (1); Borrelli, Domenico (2); Caraviello, Antonio (2); Delloro, Francesco (3); Lomonaco, Patrizio (3); Papa, Ilaria (1); Perna, Alessia Serena (1,4); Sansone, Raffaele (2); Viscusi, Antonio (1)	1: Department of Chemical, Materials and Industrial Production Engineering, University of Naples Federico II, Piazzale Tecchio 80, Naples, Italy; 2: Sophia High tech, Via Romani 228, 80048, Sant'Anastasia NA, Italy; 3: Département Mécanique et Matériaux (MINES ParisTech), Paris, France; 4: University of Bergamo, Bergamo, Italy
299	Topology and FEA modelling and optimisation of a patient-specific zygoma implant	Cholkar, Abhijit Suhas (1,2); Kinahan, David (1,2); Brabazon, Dermot (1,2)	1: I-Form, Advance Manufacturing Research Centre, Advanced Processing Technology Research Centre; 2: School of Mechanical & Manufacturing Engineering, Dublin City University, Dublin 9, Ireland

326	Raster analysis of Fused Filament Fabrication process	SPINA, Roberto (1,2,3); CAVALCANTE, Bruno (1,2)	1: Politecnico di Bari, Italy; 2: Istituto Nazionale di Fisica Nucleare (INFN) - Sezione di Bari; 3: Consiglio Nazionale delle Ricerche - Istituto di Fotonica e Nanotecnologie (CNR-IFN)
329	Integration of AM process in design cycle of metallic parts: Application to space components	Duboeuf, Frédéric (1); Lemaire, Etienne (1); Remouchamps, Alain (1); van Eekelen, Tom (1); Chary, Charles (2); François, Marc (2); Vargalui, Alexandru (3); Rodrigues, Gonçalo (3)	1: Samtech (Siemens); 2: Sonaca; 3: ESA/ESTEC
334	Direct Laser Deposition for Tailored Structure	Silvestri, Alessia Teresa (1); Amirabdollahian, Sasan (2,3); Perini, Matteo (2,3); Bosetti, Paolo (2,3); Squillace, Antonino (1)	1: University of Naples "Federico II", Dept. of Chemical, Materials and Production Engineering, P.le Tecchio 80, Naples, Italy; 2: University of Trento, Department of Industrial Engineering, via Sommarive, 9 - 38123 Trento, Italy; 3: ProM Facility, Via Zeni, 8 – 38068 Rovereto, Italy
336	Anisotropic Plastic Behavior of Additively Manufactured PH1 Steel	Liu, Wenqi (1); Li, Zinan (1); Bossuyt, Sven (1); Forsström, Antti (1); Que, Zaiqing (2); Björkstrand, Roy (1); Salmi, Mika (1); Partanen, Jouni (1); Lian, Junhe (1,3)	1: Advanced Manufacturing and Materials, Department of Mechanical Engineering, Aalto University, Finland; 2: VTT Technical Research Centre of Finland Ltd, Finland; 3: Impact and Crashworthiness Lab, Department of Mechanical Engineering, Massachusetts Institute of Technology, USA
360	Thermal analysis of Wire Arc Additive Manufacturing process	belhadj, mohamed (1); werda, sana (1); belhadj, asma (2); kromer, robin (1); darnis, philippe (1)	1: I2M de Bordeaux, France; 2: Ecole nationale d'ingénieurs de Tunis, Tunisie
383	Build platform temperature during laser powder bed fusion of AlSi10Mg; influence on 3D microstructure, strength and ductility	Santos Macías, Juan Guillermo (1); Douillard, Thierry (2); Zhao, Lv (1,3); Maire, Eric (2); Pyka, Grzegorz (1); Simar, Aude (1)	1: UCLouvain, Belgium; 2: Université de Lyon, France; 3: Huazhong University of Science and Technology, China
392	Effect of powder size and processing parameters on surface, density and mechanical properties of stainless steel 316L elaborated by Laser Powder Bed Fusion	Ziri, Sabrine; Hor, Anis; Mabru, Catherine	Institut Clément Ader (ICA), France
423	Thermal field prediction in DED manufacturing process using data driven approach	Fetni, S. (1); Pham, T.Q.D. (2); Tran, X.V. (2); Duchêne, L. (1); Tran, H.S. (1); Habraken, Anne Marie (1)	1: University of Liège, Belgium; 2: Thu Dau Mot University, Vietnam

MS14 FORMABILITY OF METALLIC MATERIALS – 14 papers

121	Determination of Forming Limits Based on Finite Element Simulations	Shen, Fuhui (1); Chen, Kai (1); Lian, Junhe (2,3); Münstermann, Sebastian (1)	1: Steel Institute, RWTH Aachen University, Germany; 2: Department of Mechanical Engineering, Aalto University, Finland; 3: Impact and Crashworthiness Lab, Massachusetts Institute of Technology, USA
183	The effect of kinematic hardening on the fatigue behaviour of bent high strength steel	Gothivarekar, Sanjay; Coppieters, Sam; Talemi, Reza; Debruyne, Dimitri	KU LEUVEN, Belgium
223	In-situ study of strain and texture evolution during continuous strain path change	Dhara, Sisir (1); Taylor, Scott (1); Figiel, Łukasz (1); Hughes, Darren (1); Shollock, Barbara (2); Hazra, Sumit (1)	1: WMG, University of Warwick, Coventry, CV4 7AL, UK; 2: Department of Engineering, King's College London, London, WC2R 2LS, UK
259	Strain distribution during air bending of ultra-high strength steels	Pokka, Aki-Petteri (1); Arola, Anna-Maija (1); Kaijalainen, Antti (1); Kesti, Vili (2); Larkiola, Jari (1)	1: University of Oulu, Materials and Mechanical Engineering, P.O. Box 4200 FI-90014 University of Oulu, Finland; 2: SSAB Europe, Rautaruukintie 115, 92101 Raahe, Finland
283	Towards high strength and high ductility 6XXX and 7XXX aluminium alloys	Lezaack, Matthieu; Hannard, Florent; Simar, Aude	Université catholique de Louvain, Belgium
310	Experimental determination and numerical prediction of the dynamic forming limits of a press hardened steel	Weiß-Borkowski, Nathalie (1); Lian, Junhe (2); Schulz-Beenken, Anne Suse (1); Tröster, Thomas (3)	1: South Westphalia University of Applied Sciences, Germany; 2: Aalto University, Finlandia; 3: Paderborn University, Germany
318	Design and Optimization of Processing Conditions for a Recent Quenched and Partitioned Steel	El-shenawy, Eman Hassan (1); Hedia, Hoda Nasr El-Din (1); Kamal El Din, Mai Mohamed (2); Badwy, Hoda Refaiy (1)	1: CMRDI, Egypt; 2: Cairo University, Egypt
355	Investigation on the ductile fracture of a high-strength dual-phase steel with anisotropic damage mechanics model	Li, Zinan (1); Liu, Wenqi (1); Shen, Fuhui (2); Münstermann, Sebastian (2); Lian, Junhe (1,3)	1: Advanced Manufacturing and Materials, Department of Mechanical Engineering, Aalto University, Finland; 2: Integrity of Materials and Structures, Steel Institute, RWTH Aachen University, Germany; 3: Impact and Crashworthiness Lab, Department of Mechanical Engineering, Massachusetts Institute of Technology, USA
380	Influence of temperature on the formability of an aluminum alloy	Kacem, Ahmed; Laurent, Hervé; Thuillier, Sandrine	Univ. Bretagne Sud, UMR CNRS 6027, IRDL, F-56100, Lorient, France

382	Forming defects prediction in cup drawing and embossing of a thick steel sheet	Oliveira, Marta C. (1); Neto, Diogo M. (1); Barros, Pedro D. (2); Alves, José L. (3); Menezes, Luís F. (1)	1: CEMMPRE, Department of Mechanical Engineering, University of Coimbra, Portugal; 2: SRAMPORT, Coimbra, Portugal; 3: CMEMS, Microelectromechanical Systems Research Unit, University of Minho, Portugal
387	Influence of the Laser Heat Treatment on the AA5754-H32 strain path during hydraulic bulge tests	Cusanno, Angela (1); Moturu, Shanmukha (2); Carty, David (2); Palumbo, Gianfranco (1)	1: Department of Mechanical Engineering, Mathematics & Management Engineering, Politecnico di Bari, Via Orabona, 4, 70125 Bari, Italy; 2: Advanced Forming Research Centre, University of Strathclyde, 85 Inchinnan Drive, Renfrew PA4 9LJ, United Kingdom
394	Formability of AA7075-W in hole-expansion	Choi, Yumi (1); Ha, Jinjin (2); Lee, Myoung-Gyu (1); Korkolis, Yannis P (3)	1: Seoul National University, Republic of Korea; 2: University of New Hampshire, United States of America; 3: Ohio State University, United States of America
413	Effect of single crystal orientation on forming	Chandola, Nitin; Cazacu, Oana; Revil-Baudard, Benoit	University of Florida, United States of America
417	Expansion of oval tubes: prediction and experiment	Clausmeyer, Till (1); Gutknecht, Florian (1); ul-Hassan, Hamad (2); Kaya, Deniz (1); Stiglmair, Manfred (2); Tadeu, Francisco (2); Stennei, Markus (1)	1: TU Dortmund-Institute of Forming Technology and Lightweight Components, Germany; 2: Faurecia Emissions Control Technologies, Germany GmbH

MS15 INCREMENTAL AND SHEET METAL FORMING – 21 papers

106	Influencing the forming zone by altering the contact pressure in a bending process	Frohn-Sörensen, Peter; Reuter, Jonas; Engel, Bernd	University of Siegen, Chair of Forming Technology, Germany
110	Roughness development of polymer coated steel during the production process of a can.	Venema, Jenny; Jonker, Fred; Stegeman, Richard	Tata Steel, Netherlands, The
129	A Versatile IoT-Approach to Process Data Acquisition	Behrens, Bernd-Arno; Krimm, Richard; Koß, Jonas; Höber, André	Institute of Forming Technology and Machines
146	Experimental Investigation of Process Forces and Part Quality for Fine Blanking of Stainless Steel with Inductive Heating	Weiser, Ingo Felix (1); Mannens, Robby (1); Feuerhack, Andreas (1); Bergs, Thomas (1,2)	1: Laboratory for Machine Tools and Production Engineering WZL, RWTH Aachen University, Germany; 2: Fraunhofer-Institute for Production Technology IPT
155	Investigation on tailored blanks in a full forward extrusion process of sheet-bulk metal forming	Reck, Manuel; Merklein, Marion	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
172	Accuracy in microstructure measurements in highly directional processes	Magro, Tommaso; Ghiotti, Andrea; Bruschi, Stefania; Simonetto, Enrico	Università degli Studi di Padova, Italy
177	Evaluation of Material Behavior of Wire Strip under Cyclic Bending Load and Preparation of an Experimental Test Method	Biallas, Alina; Merklein, Marion	Friedrich-Alexander Universität Erlangen-Nürnberg, Germany
195	Finite Element Analysis of Stretch Forming of an Open Profile Made of Ultra-High Strength Martensitic MS1500 Steel	Görtan, Mehmet Okan (1); Türkmen, Ümit (2)	1: Hacettepe University, Turkey; 2: Linde Opsan Otomotiv Parca San. ve Tic. A.S, Turkey
220	Numerical design of load response in magneto-rheological actuators for sheet metal stamping	Brun, Michele; Ghiotti, Andrea; Simonetto, Enrico; Bruschi, Stefania	University of Padova, Department of Industrial Engineering, Via Venezia 1, 35131, Padova, Italy
252	Rapid Tooling for Impulse Forming	Langstädtler, Lasse (1,3); Intemann, Alex Peer (1,3); Herrmann, Marius (1,2,3); Schenck, Christian (1,2,3); Pegel, Holger (1); Kuhfuss, Bernd (1,2,3)	1: bime, Bremen Institute for Mechanical Engineering, Badgasteiner Str. 1, Bremen, 28359, Germany; 2: MAPEX Center for Materials and Processing, Postfach 330440, 28334 Bremen, Germany; 3: University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany
275	Media-based forming of micro-flow channels into thin sheet metal by electromagnetically driven tools	Linnemann, Maik; Scheffler, Christian; Psyk, Verena	Fraunhofer Institute for Machine Tools and Forming Technologie, Germany

278	A cost effective method for bulge prediction in two point incremental forming	Shin, Jaekwang; Bansal, Ankush; Cheng, Randy; Taub, Alan; Banu, Mihaela	University of Michigan, United States of America
312	Simulation of the micro Single Point Incremental forming process of very thin sheets	Thuillet, Stéphanie (1); Manach, Pierre-Yves (1); Richard, Fabrice (2); Thibaud, Sébastien (2)	1: Univ. Bretagne-Sud, IRDL, UMR CNRS 6027, 56100 Lorient, France; 2: Univ. Bourgogne Franche-Comté, FEMTO-ST Institute, CNRS/UFC/ENSMM/UTBM, France
322	Forming Using Polyurethane Plate for stamping Various Materials type Austenitic Steel, Aluminium Alloys, Copper Alloys	Bałon, Paweł; Kiełbasa, Bartłomiej; Kowalski, Łukasz; Szostak, Janusz	AGH University of Science and Technology, Department of Manufacturing Systems, Mickiewicza Avenue 30-B2, 30-059 Cracow, Poland
335	Analytic Model for Multi-point Large-Radius Bending of Steel Sheets	Thielen, Cedric (1,2,3); Decroos, Koen (2); Shore, Diarmuid (2); Crevecoeur, Guillaume (1,3); De Belie, Frederik (1,3)	1: Department of Electromechanical, System and Metal Engineering, Ghent University, Ghent, Belgium; 2: OptiQuench, Ghent, Belgium; 3: EEDT Decision and Control, Flanders Make, Belgium
354	Understanding formability and geometrical accuracy of SPIF process used as a reshaping process	Zaheer, Omer; Ingarao, Giuseppe; Di Lorenzo, Rosa; Fratini, Livan	University of Palermo, Italy
365	Forming of metastable austenitic stainless steel tubes with axially graded martensite content by flow-forming	Arian, Bahman (1); Riepold, Markus (2); Rozo Vasquez, Julian (3); Homberg, Werner (1); Trächtler, Ansgar (2); Walther, Frank (3)	1: Paderborn University, Paderborn (Germany); 2: Fraunhofer Institute for Mechatronic Systems Design, Paderborn (Germany); 3: TU Dortmund University, Dortmund (Germany)
370	Control of corrosion features by forming parameters	Bösing, Ingmar (1,2); Ortmann-Ishkina, Svetlana (1,3); Herrmann, Marius (1,3,4); Schenck, Christian (1,3,4); Kuhfuss, Bernd (1,3,4); Baune, Michael (1,2,4)	1: University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany; 2: CVT, Chemical Process Engineering, Leobener Str. 6, Bremen, 28359, Germany; 3: bime, Bremen Institute for Mechanical Engineering, Badgasteiner Str. 1, Bremen, 28359, Germany; 4: MAPEX Center for Materials and Processing, Postfach 330440, 28334 Bremen, Germany
374	Sequential Dual Sided SPIF Using Low Order Geometry Reconstruction	Carette, Yannick; Duflou, Joost R.	KU Leuven, Belgium
389	Revisiting flangeability in hole-flanging by single-stage incremental forming and conventional process	Borrego, Marcos; Morales-Palma, Domingo; López-Fernández, José Andrés; Martínez-Donaire, Andrés J.; Centeno, Gabriel; Vallellano, Carpóforo	Universidad de Sevilla, Spain

390	Numerical/experimental investigation of bulge tests on a localized laser heat-treated magnesium alloy AZ31 sheet	Guglielmi, Pasquale (1); Sorgente, Donato (2); Palumbo, Gianfranco (1)	1: Politecnico di Bari, Italy; 2: Università degli Studi della Basilicata, Italy

MS16 MATERIAL BEHAVIOUR MODELLING – 15 papers

151	On the multiscale analysis of a two phase material : crystal plasticity versus mean field	Mirhosseini, Seyedeh Shahrzad (1); Perdahcioglu, Emin Semih (1); Boogaard, Ton van den (1); Atzema, Eisso (1,2)	1: University of Twente, Netherlands, The; 2: TATA Steel, Netherlands
185	Influence of specimen geometry and strain rate on elongation in tensile testing of packaging steel	Knieps, Fabian (1); Köhl, Manuel (1); Merklein, Marion (2)	1: thyssenkrupp Rasselstein GmbH, Germany; 2: Institute of Manufacturing Technology, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
204	Flow Curve Prediction of Cold Forging Steel by Artificial Neural Network Model	Kocatürk, Fatih (1,2); Toparli, M. Burak (1); Tanrıkulu, Barış (1,3); Yurtdaş, Sezgin (1,4); Zeren, Doğuş (1); Kılıçaslan, Cenk (1)	1: R&D Center, Norm Cıvata San. ve Tic. A.Ş., AOSB, İzmir, Turkey; 2: Graduate School, Applied Mathematics and Statistics, İzmir University of Economics, İzmir, Turkey; 3: The Graduate School of Natural and Applied Sciences, Dokuz Eylül University, İzmir, Turkey; 4: Mechanical Engineering Department, Katip Çelebi University, İzmır, Turkey
241	Towards a dislocation-based model for strain path effects in bainitic pipeline steels	Bönisch, Matthias (1); Seefeldt, Marc (1); Van Bael, Albert (1); Sanchez, Nuria (2); Cooreman, Steven (2)	1: KU Leuven, Department of Materials Engineering, Kasteelpark Arenberg 44, box 2450, 3001 Leuven, Belgium; 2: ArcelorMittal Global R&D Gent, OCAS NV, Pres. J. F. Kennedylaan 3, 9060 Zelzate, Belgium
282	Determination of Plastic Material Properties of Thin Sheets under Electromagnetic Forming Conditions	Beckschwarte, Björn (1,3); Herrmann, Marius (1,2,3); Schenck, Christian (1,2,3); Kuhfuss, Bernd (1,2,3)	1: bime, Bremen Institute for Mechanical Engineering, Badgasteiner Str. 1, 28359 Bremen, Germany; 2: MAPEX Center for Materials and Processing, Postfach 330440, 28334 Bremen, Germany; 3: University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany
289	A numerical investigation about temperature influence on thermoplastic hot-formed reinforced composites under low-velocity impact	Bruno, Matteo (1); Carrino, Luigi (1); Esposito, Luca (1); Lopresto, Valentina (1); Papa, Ilaria (1); Russo, Pietro (2); Viscusi, Antonio (1)	1: Department of Chemical, Materials and Production Engineering, University of Naples Federico II, Piazzale V. Tecchio 80, 80125 Napoli, Italy; 2: Institute of Polymers, Composites and Biomaterials – National Research Council, Via Campi Flegrei 34, 80078 Napoli, Italy

316	Self-consistent, polycrystal rate-independent crystal plasticity modeling for yield surface determination	Perdahcioglu, Semih; Mirhosseini, Shahrzad; van den Boogaard, Ton	University of Twente, The Netherlands
323	The identification of strain-stress curve for 5049 aluminum based on tube hydraulic bulging test	Zhang, Bin (1); Endelt, Benny (1); Lang, Lihui (2); Zhao, Yang (3); Yan, Shu (3); Nielsen, Karl Brian (4)	1: Aalborg University, Denmark; 2: Beihang University, China; 3: Northeastern University, China; 4: Aarhus University, Denmark
345	A comparison of different hardening rules on a multi-step global manufacturing process modeling	Britez, Diego; Werda, Sana; Laheurte, Raynald; Darnis, Philippe; Cahuc, Olivier	Université de Bordeaux, France
346	Material Model Calibration of 3D Printed Lattice Structures	Mancini, Edoardo (1); Utzeri, Mattia (2); Farotti, Emanuele (2); Sasso, Marco (2)	1: Università degli Studi dell'Aquila, DIIIE, Piazzale Ernesto Pontieri, Monteluco di Roio, 67100 L'Aquila, Italy; 2: Università Politecnica delle Marche, DIISM, Via Brecce Bianche, 60121 Ancona, Italy
351	A numerical investigation on the effects of porosity on the plastic anisotropy of additive manufactured stainless steel with various crystallographic textures	Wu, Jiaojiao (1); Liu, Wenqi (1); Vajragupta, Napat (2); Hartmaier, Alexander (2); Lian, Junhe (1,3)	1: Aalto University, Finland; 2: Ruhr-Universität Bochum, Germany; 3: Massachusetts Institute of Technology, USA
377	Numerical prediction of process-dependent properties of high-performance Ti6Al4 in LS-DYNA	Buhl, Johannes (1); Kloeppel, Thomas (2); Merten, Mathias (2); Haufe, André (2); Rameez, Israr (1); Bambach, Markus (1,3)	1: Chair Construction and Production, BTU Cottbus – Senftenberg; 2: DYNAmore GmbH; 3: Advanced Manufacturing Lab, ETH Zürich
415	Effect of microstructure on the formability of Ti21S alloy	Hu, Cai (1); Leotoing, Lionel (1); Castany, Philippe (2); Guines, Dominique (1); Gloriant, Thierry (2)	1: Univ Rennes, INSA Rennes, LGCGM-EA 3913, Rennes, France; 2: Univ Rennes, INSA Rennes, CNRS, ISCR UMR 6226, Rennes, France
418	A study by nanoindentation and finite element modeling of AlSi10Mg inclusion-matrix behavior.	Tran, H.S.; Bouffioux, C.; Dedry, O.; Rojas-Ulloaa, C.; Duchêne, L.; Mertens, A.; Habraken, A.M.	Uliege, Belgium
419	Modeling of failure at the interface of ductile materials by applying the cohesive discontinuous Galerkin method	Bayat, Hamid Reza (1); Rajaei Harandi, Ali (1); Rezaei, Shahed (2); Brepols, Tim (1); Reese, Stefanie (1)	1: RWTH Aachen University; 2: Technical University of Darmstadt