

Contents

Forming Machine Tools and Manufacturing Processes

Experimental Characterisation of Tool Hardness Evolution Under Consideration of Process Relevant Cyclic Thermal and Mechanical Loading During Industrial Forging.	3
F. Müller, I. Malik, H. Wester, and B.-A. Behrens	
Modelling of Hybrid Parts Made of Ti-6Al-4V Sheets and Additive Manufactured Structures.	13
J. Hafenecker, T. Papke, F. Huber, M. Schmidt, and M. Merklein	
Investigation of a Superimposed Oscillation Compression Process for the Production of a Bulk Component	23
D. Rosenbusch, P. Müller, S. Hübner, K. Brunotte, and B.-A. Behrens	
Towards an Adaptive Production Chain for Sustainable Sheet-Metal Blanked Components	34
P. Niemietz, T. Kaufmann, M. Unterberg, D. Trauth, and T. Bergs	
Investigation on Noise Reduction During Cutting of High-Strength Materials Based on Machine Acoustic Simulation.	45
D. Friesen, R. Krimm, S. Fries, K. Brunotte, and B.-A. Behrens	
Equal-Channel-Angular-Swaging for the Production of Medical Implants Made of Fine-Grained Titanium.	56
L. Kluy, F. Chi, and P. Groche	
Numerical Development of a Tooling System for the Co-extrusion of Asymmetric Compound Profiles on a Laboratory Scale.	66
N. Heimes, J. Uhe, S. E. Thürer, H. Wester, H. J. Maier, C. Klose, and B.-A. Behrens	
Investigation of the Phase Transformation in Hot Stamping Processes with Regard to the Testing Facility	76
A. Horn, T. Hart-Rawung, J. Buhl, M. Bambach, and M. Merklein	

Simulation of an Electromagnetic Foil-Feeding Device.	86
O. Commichau, A. Höber, B.-A. Behrens, and R. Krimm	
Extension of Process Limits with Bidirectional Deep Drawing	96
S. Kriechenbauer, P. Müller, R. Mauermann, and W.-G. Drossel	
Further Development of a Hydraulically Operated Oscillation Device for Application to an Industrial Forming Process	105
P. Müller, D. Rosenbusch, N. Missal, H. Vogt, S. Hübner, and B.-A. Behrens	
Investigation of Clinched Joints – A Finite Element Simulation of a Non-destructive Approach	116
B. Sadeghian, C. Guillaume, R. Lafarge, and A. Brosius	
Experimental Process Design for Reclamation of Geared Components. . .	125
P. Kuwert, T. Petersen, K. Brunotte, and B.-A. Behrens	
A New Approach for the Evaluation of Component and Joint Loads Based on Load Path Analysis.	134
C. Steinfelder and A. Brosius	
Microstructure and Mechanical Properties of Thermomechanically Forged Tempering Steel 42CrMo4	142
J. Diefenbach, K. Brunotte, and B.-A. Behrens	
Dynamic Performance of Polymer-Steel-Hybrids Manufactured by Means of Process Integration	151
M. Demes, T. Ossowski, P. Kabala, S. Bienia, and K. Dröder	
Investigation of the Scaling of Friction Coefficients from the Nano to the Micro Level for Base Materials and Coatings	161
N. Heimes, F. Pape, D. Konopka, S. Schöler, K. Möhwald, G. Poll, and B.-A. Behrens	
Investigation of Parameters Influencing the Producibility of Anodes for Sodium-Ion Battery Cells.	171
J. Hofmann, A.-K. Wurba, B. Bold, S. Maliha, P. Schollmeyer, J. Fleischer, J. Klemens, P. Scharfer, and W. Schabel	
Numerical Investigation of an Extruded Shaft for High Temperature Applications Manufactured by Tailored Forming	182
C. Büdenbender, I. Ross, H. Wester, A. Zaitsev, and B. A. Behrens	
Introduction of Composite Hot Extrusion with Tubular Reinforcements for Subsequent Cold Forging	193
P. Kotzyba, K. C. Grötzinger, O. Hering, M. Liewald, and A. E. Tekkaya	
Experimental Springback Validation of a Finite Element Model of Multi-stage Stator Bending	202
D. Wüterich, M. Liewald, and M. Kopp	

Cutting Machine Tools and Manufacturing Processes

Concept of a Mechatronic System for Targeted Drill Head Direction and Angular Alignment Control in BTA Deep Hole Drilling	215
J. F. Gerken and D. Biermann	
Influence of a Two-Cut-Strategy on Tool Wear in Gear Hobbing	225
N. Troß, J. Brimmers, and T. Bergs	
Application Potential of Thermoelectric Signals for Temperature Monitoring in Turning of Aluminum Alloys.	235
T. Junge, A. Nestler, and A. Schubert	
Modeling of Contact Conditions and Local Load in Bevel Gear Grinding	246
M. Solf, J. Brimmers, and T. Bergs	
Design of Pulsed Electrochemical Machining Processes Based on Data Processing and Multiphysics Simulation	256
I. Schaarschmidt, S. Loebel, P. Steinert, M. Zinecker, and A. Schubert	
Functional PVD Hard Coatings for High Temperature Cutting Processes	266
N. Stachowski, N. C. Kruppe, T. Brögelmann, and K. Bobzin	
Wear Behaviour of PCBN, PCD, Binderless PCBN and Cemented Carbide Cutting Inserts When Machining Ti-6Al-4V in an Oxygen-Free Atmosphere	275
F. Schaper, B. Denkena, M.-A. Dittrich, A. Krödel, J. Matthies, and S. Worpenberg	
Influence of Nozzle Position during Cryogenic Milling of Ti-6Al-4V	284
K. Gutzeit, H. Hotz, B. Kirsch, and J. C. Aurich	
Lifespan Investigations of Linear Profiled Rail Guides at Pitch and Yaw Moments.	294
S. Ihlenfeldt, J. Müller, and D. Staroszyk	
Towards the Prediction of Compliance Influences on Shape Deviations in Internal Traverse Grinding	304
N. Schmidt, T. Tsagkir Dereli, T. Furlan, R. Holtermann, D. Biermann, and A. Menzel	
Numerical Modelling of the Aeroacoustic and Flow Behaviour of Chip Fans.	315
C. Menze, C. Zizelmann, M. Schneider, K. Güzel, and H.-C. Möhring	
Estimation of the Influence of Volumetric Correction Approaches on the Thermo-Elastic Correction Accuracy	324
X. Thiem, B. Kauschinger, J. Müller, and S. Ihlenfeldt	

Inline Measurement of Process Forces and Development of a Friction Model in Abrasive Flow Machining	334
S. Roßkamp and E. Uhlmann	
Fast Evaluation of Volumetric Motion Accuracy of Multi-axis Kinematics Using a Double Ballbar	345
R. Zhou, B. Kauschinger, C. Friedrich, and S. Ihlenfeldt	
Additive Processes	
Evaluating the Cumulative Energy Demand of Additive Manufacturing Using Direct Energy Deposition	357
S. Ehmsen, L. Yi, and J. C. Aurich	
Building Blocks for Digitally Integrated Process Chains in PBF-Based Additive Manufacturing	368
M. Sjarov, N. Ceriani, T. Lechler, and J. Franke	
Correlation of Spatter Quantity and Speed to Process Conditions in Laser Powder Bed Fusion of Metals	378
E. Eschner, K. Schwarzkopf, T. Staudt, and M. Schmidt	
Investigation on Structural Integration of Strain Gauges using Laser-Based Powder-Bed-Fusion (LPBF)	387
M. Link, M. Weigold, J. Probst, R. Chadda, C. Hartmann, M. Hessinger, M. Kupnik, and E. Abele	
3D Printing Technology for Low Cost Manufacturing of Hybrid Prototypes from Multi Material Composites	396
L. Penter, J. Maier, B. Kauschinger, T. Lebelt, N. Modler, and S. Ihlenfeldt	
Automated Assembly and Robotics	
Value Stream Kinematics	409
E. Mühlbeier, P. Gönnheimer, L. Hausmann, and J. Fleischer	
Simulation-Based Robot Placement Using a Data Farming Approach ...	419
T. Lechler, G. Krem, M. Metzner, M. Sjarov, and J. Franke	
Frequency-Based Identification of the Inertial Parameters of an Industrial Robot	429
L. Gründel, C. Reiners, L. Lienenlücke, S. Storms, C. Brecher, and D. Bitterolf	
Increasing Efficiency in Maintenance Processes Through Modular Service Bundles	439
J. Fuchs, H. Herrmann, S. J. Oks, M. Sjarov, and J. Franke	
Domain-Specific Language for Sensors in the Internet of Production ...	448
M. Bodenbenner, M. P. Sanders, B. Montavon, and R. H. Schmitt	

An Economic Solution for Localization of Autonomous Tow Trucks in a Mixed Indoor and Outdoor Environment Using a Node Based Approach	457
M. Zwingel, M. Herbert, M. Lieret, P. Schuderer, and J. Franke	
Automated Assembly of Thermoplastic Fuselage Structures for Future Aircrafts.	467
S. Kothe, B. Diehl, D. Niermann, L. Chen, M. Wolf, and W. Hintze	
Towards Adaptive System Behavior and Learning Processes for Active Exoskeletons.	476
B. Otten, N. Hoffmann, and R. Weidner	
Machine Learning	
Research on Preprocessing Methods for Time Series Classification Using Machine Learning Models in the Domain of Radial-Axial Ring Rolling	487
S. Fahle, A. Kneißler, T. Glaser, and B. Kuhlenkötter	
Process Monitoring Using Machine Learning for Semi-Automatic Drilling of Rivet Holes in the Aerospace Industry	497
L. Köttner, J. Mehnen, D. Romanenko, S. Bender, and W. Hintze	
Sustainable Interaction of Human and Artificial Intelligence in Cyber Production Management Systems	508
P. Burggräf, J. Wagner, and T. M. Saßmannshausen	
Autoconfiguration of a Vibration-Based Anomaly Detection System with Sparse a-priori Knowledge Using Autoencoder Networks	518
J. Hillenbrand and J. Fleischer	
Combining Process Mining and Machine Learning for Lead Time Prediction in High Variance Processes	528
M. Welsing, J. Maetschke, K. Thomas, A. Gützlaff, G. Schuh, and S. Meusert	
Development of a Temperature Strategy for Motor Spindles with Synchronous Reluctance Drive Using Multiple Linear Regression and Neural Network	538
M. Weber, F. He, M. Weigold, and E. Abele	
Concept for Predicting Vibrations in Machine Tools Using Machine Learning.	549
D. Barton and J. Fleischer	
Automated Profiling of Energy Data in Manufacturing	559
C. Kaymakci and A. Sauer	

Automated Identification of Parameters in Control Systems of Machine Tools	568
P. Gönnheimer, A. Puchta, and J. Fleischer	
Management Sciences	
Process Cost Calculation Using Process Data Mining	581
A. Menges, C. Dölle, M. Riesener, and G. Schuh	
Refining Circulation Factories: Classification Scheme and Supporting Product and Factory Features for Closed-Loop Production Integration	591
J. Rickert, S. Blömeke, M. Mennenga, F. Cerdas, S. Thiede, and C. Herrmann	
Complexity-Oriented Description of Cyber-Physical Systems	602
A. Keuper, C. Dölle, M. Riesener, and G. Schuh	
Adapted Process Model for Manufacturing Within Production Networks	611
M. Reimche, S. Berghof, and J. P. Bergmann	
Organizational Agility in Development Networks	621
M. Kuhn, C. Dölle, M. Riesener, and G. Schuh	
Towards a Concept for an Employee-Specific Retention Strategy in Value-Adding Areas	631
S. Korder and G. Reinhart	
Identification of Project-Related Context Factors for the Tailored Design of Hybrid Development Processes	640
J. Ays, C. Dölle, M. Riesener, and G. Schuh	
Systematization of Adaptation Needs in the Design of Global Production Networks	650
N. Rodemann, M. Niederau, K. Thomas, A. Gützlaff, and G. Schuh	
Data-Assisted Value Stream Method	660
C. Urnauer, V. Gräff, C. Tauchert, and J. Metternich	
Definition of Process Performance Indicators for the Application of Process Mining in End-to-End Order Processing Processes	670
S. Schmitz, F. Renneberg, S. Cremer, A. Gützlaff, and G. Schuh	
Highly Iterative Planning of Mixed-Model Assembly Lines	680
J. Maetschke, B. Fränken, F. Sauermann, A. Gützlaff, and G. Schuh	
Token-Based Blockchain Solutions for Supply Chain Strategies	689
F. Dietrich, A. Turgut, D. Palm, and L. Louw	

**Determination of a Dedicated, Cost-Effective Agility
in Manufacturing Networks** 699
J. Ays, A. Güzlaff, K. Thomas, F. Berbecker, and G. Schuh

**Requirements for an Event-Based Visualization
of Product Complexity** 707
J. Koch, C. Dölle, M. Riesener, and G. Schuh

**Design of Tailored Subscription Business Models – A Guide
for Machinery and Equipment Manufacturers** 717
Y. Liu, A. Güzlaff, S. Cremer, T. Grbev, and G. Schuh

Author Index 729