

Table of Contents

Preface

Chapter 1: Energy Efficiency as an Element of a Strategy for Sustainable Production

The Least Energy Demand Method as Metric to Evaluate Different Production Levels Based on the Relative Energy Efficiency S. Kreitlein, I. Kupfer, M. Brandmeier and J. Franke	3
The Relative Energy Efficiency as Standard for Evaluating the Energy Efficiency of Production Processes Based on the Least Energy Demand S. Kreitlein, I. Kupfer, M. Mühlbauer and J. Franke	11
The Least Energy Demand Method as Metric to Describe the Relative Energy Efficiency of a Product Based on its Manufacturing S. Kreitlein, I. Kupfer, M. Scholz and J. Franke	19
Smart Factory Meets Smart Grid: Cyber-Physical Compressed Air Systems Enable Demand Side Management in Industrial Environments R. Boehm, J. Bürner and J. Franke	25
Multi Criteria Decision Making Enhancing Sustainable Energy Management J. Boehner	32
Green Energy Management Portal – Knowledge and Project Management for Energy Efficiency Projects M. Brandmeier, K. Rummler, M. Brossog and J. Franke	38
Scenario Based Method to Increase the Flexibility of Energy Use in Production Systems E. Unterberger, J. Glasschröder and G. Reinhart	46
Ontology-Based Description of Energy Optimization Potentials for Production Environments M. Brandmeier, F. Schäfer, S. Kreitlein and J. Franke	53
A Conformity Check and Optimization of the Energy Management System Based on ISO 50001 T. Javied, F. Dlugosch, T. Maul and J. Franke	61
Simulation Based Evaluation of Energy Saving Potentials in the Field of Electric Drives Manufacturing S. Spreng, J. Kohl, P. Proshkovsky and J. Franke	67
Intelligent Energy Profiling for Decentralized Fault Diagnosis of Automated Production Systems J. Kohl, H. Fleischmann and J. Franke	73
Approaches for Monitoring the Energy Consumption with Machine Learning Methods C. Gebbe, J. Glasschröder and G. Reinhart	79
Integrated Energy-Controlling in Industrial Value Chains T. Rackow, T. Donhauser, P. Schuderer and J. Franke	86
E Flow - From Production Line Concept to a Physically and Digitally Full-Meshed Production Network M. Scholz, M. Hußnätter, S. Kreitlein and J. Franke	94

Chapter 2: Equipments and Technologies of Sustainable Production

Research on the Influence of Geometry and Positioning on Laser Sintered Parts M. Launhardt, C. Fischer and D. Drummer	105
Influence of Pre-Strain and Simulated Paint-Bake on Mechanical Properties of High Strength Aluminum Alloy AA7020 M. Merklein and J. Degner	115
A System Embracing Observation of Different PTFE-Compounds in the Sealing Application of Rotary Manifolds J. Müller, R. Illek, G. Michos, K. Faust, M. Hubert and J. Franke	123

Influence of Processing Parameters in Reaction Injection Foam Molding for Multi-Layer Parts on Foam Structure and Mechanical Properties M. Löhner and D. Drummer	131
Functional Printing of Silver Nano Ink on Injection Molded Polymeric Substrates J. Bahr, J. Schirmer and M. Reichenberger	139
GreenBearings – Friction Behaviour of DLC-Coated Dry Running Deep Groove Ball Bearings J. Kröner, S. Tremmel, S. Kursawe, Y. Musayev, T. Hosenfeldt and S. Wartack	147
Numerical Investigations on the Influence of Process Parameters on the Forming of Gears in Forward Extrusion M. Merklein, C. Kiener and A. Reiss	154
Energy Efficient Laser Beam Welding of Metals with a Ultra-High Brightness Direct-Diode Laser System A. Laukart, M. Dobler, S. Kohl, H. Fritsche, A. Grohe, B. Kruschke and M. Schmidt	162
Influence of Surface Structured Filler Wires on Laser Beam Welding of Copper Alloys V. Mann, F. Gärtner, F. Hugger, K. Hofmann, F. Tenner and S. Roth	171
Automated Pattern Recognition in Load Profiles of Milling Operations A. Reger, H.H. Westermann and A.P. Aires	180
Energy Demand Simulation of Machine Tools with Improved Chatter Stability Achieved by Active Damping R. Kleinwort, R.S.H. Popp, B. Cavalié and M.F. Zaeh	187
Energy Efficiency Analysis of Vapor Phase Soldering Technology through Exergy-Based Metric A. Esfandyari, A. Syed-Khaja, M. Horvath and J. Franke	196
Measurement of the Resource Consumption of a Selective Laser Melting Process C. Gebbe, M. Lutter-Günther, B. Greiff, J. Glasschröder and G. Reinhart	205
Economic and Ecological Evaluation of Hybrid Additive Manufacturing Technologies Based on the Combination of Laser Metal Deposition and CNC Machining M. Lutter-Günther, S. Wagner, C. Seidel and G. Reinhart	213
A Dynamic Simulation Model of Industrial Robots for Energy Examination Purpose Paryanto, A. Hetzner, M. Brossog and J. Franke	223
Evaluation of Model Based Predictive Control Algorithms for Fractional Horse Power Drives M. Blank, S. Wendel, P. Loehdefink and A. Dietz	231
Energetic Simulation of Complex Mechatronic Drive Systems over Complete Drive Cycles S. Hörlin, A. Dietz, M. Hubert and J. Franke	241
Simulation-Based Optimization of the Energy Consumption in the Hardening Process for Calcium Silicate Masonry Units T. Donhauser, J. Ehrhardt, T. Rackow, J. Franke and P. Schuderer	249
Improving Resource and Energy Efficiency of Packaging Machines: Contribution of an Increasing Format Flexibility G. Götz, P. Stich, S. Thunig, J. Glasschröder and G. Reinhart	257
Energy Efficiency and Productivity Optimization of Industrial Cleaning Equipment F. Kübler, T.H.J. Uhlemann, J. Dill and R. Steinhilper	265