

Digital Manufacturing

Prospects and Challenges

Edited by
Christoph Haag & Torsten Niechoj

Metropolis-Verlag
Marburg 2016

Contents

Foreword. Industrie 4.0 – A Paradigm Shift	7
Preface	11
Part I – Due Digital – Prospects and Challenges for Industrial Companies	13
<i>Muhammad Ashfaq and Christoph Haag</i> Value Chain Digitisation: A Practical Roadmapping Guideline	15
<i>Ulrich Greveler</i> Heuristic Cyber Risk Assessment of Industrial Control Systems	35
<i>Michael Schwind</i> Information Logistics and Digital Manufacturing. How Logistics of Information can Help to Reduce the Burden of the Logistics of Goods	47
Part II – Focus on Additive Manufacturing	65
<i>Johannes Triebs, Achim Kampker and Peter Ayvaz</i> Rapid Additive Tooling for the Cost-effective Production of Tailor-made E-Mobility Solutions	67
<i>Ulrich Jahnke and Rainer Koch</i> Prevention of Product Piracy – Potentials of Additive Manufacturing	85
<i>Christoph Haag</i> Universal Manufacturing Technologies for the Digital Manufacturing Future	105

Christian Lindemann, Gereon Deppe and Rainer Koch
Scenario Based Outlook of Additive Manufacturing Applications
for the Aerospace Market 131

Part III – Thinking Ahead with Production Simulation 153

Christian Berendonk, Alexander Klein and Alexander Struck
Robustness Optimization of Global Production Networks 155

Nikolas Theissen, Alexander Klein and Stefanie Dederichs
Industrial Internet Model Factory (“Lean Game 4.0”) 177

Caroline Fengler, Alexander Klein and Alexander Struck
EPEI Simulation Tool for Production Interval Optimization for
Seasonal and Non-Seasonal Product Demands 191

Part IV – Economic and Social Change 205

Torsten Niechoj
The Economic Theory of the Firm in the Era of
Digital Manufacturing 207

Ludger Eversmann
A New Kind of Social Order? The Economic and Societal
Implications of Digital Manufacturing 241

Klaus Hegemann
The Efficiency Frontier and Conflicting Human Interest 263

Editors and Authors 281