Contents

Chapter 1: Business Process Design and Quality Management 1
  1. THE COMPANY AS A SYSTEM 1
  2. MODEL 3
  3. METHOD AND MODELING LANGUAGE 5
  4. BUSINESS PROCESS 6
  5. QUALITY MANAGEMENT 7
  6. BUSINESS PROCESS MODEL 7
  7. BUSINESS PROCESS DESIGN 7

Chapter 2: Requirements of Business Process Design 9
  1. INTRODUCTION 9
  2. REQUIREMENTS OF ORGANIZATIONAL DEVELOPMENT 9
  3. REQUIREMENTS OF QUALITY MANAGEMENT 11
  4. REQUIREMENTS OF INFORMATION SYSTEMS PLANNING 13
  5. REQUIREMENTS OF CONTROLLING AND COST ACCOUNTING 14
  6. SUMMARY AND NEED FOR ACTION 15

Chapter 3: Quality-Oriented Design of Business Processes 17
  1. INTRODUCTION 17
  2. MODELING LANGUAGE TO DESCRIBE BUSINESS PROCESSES AND QUALITY ASPECTS 18
     2.1 Basic Constructs ................................................. 18
     2.2 Views .................................................................. 23
     2.3 Process Modeling .................................................. 25
5.2 ISO 9000 Reference Models .................................................. 126
5.3 Descriptive Rules of IEM Reference Models ......................... 127
6. BENEFITS OF MODEL-BASED QM DOCUMENT DEVELOPMENT 132

Chapter 7: Case Study 133
1. TARGETS AND APPROACH 133
2. DESCRIPTION OF THE COMPANY 135
3. ACTUAL STATE ANALYSIS 136
   3.1 Process Structure of the Company .................................. 136
   3.2 Description of Time, Cost and Quality Requirements .......... 141
   3.3 Development and Description of Weak Points ................. 143
4. TARGET CONCEPT 150
   4.1 Design ............................................................... 150
   4.2 Production Planning .............................................. 151
   4.3 Design and Production of Manufacturing Devices .......... 153
5. IMPLEMENTATION OF QM SYSTEM 156
   5.1 Goals ............................................................... 156
   5.2 Approach .......................................................... 156
   5.3 Short Summary of Results ....................................... 157
   5.4 Target Concept and a Plan of Measures ...................... 158
6. FINAL RESULT OF THE CASE STUDY 160

Chapter 8: Standardization 161
1. INTRODUCTION 161
2. NATIONAL 161
   2.1 NAM 96.5.1 ‘Framework for a CIM System Integration’ .......... 162
   2.2 NAM 96.4.8 ‘Industrial Manufacturing Data Management’ ...... 162
   2.3 NAM 96.4.4 ‘Methodology, Tests of Conformity and Implementation’ .................................................. 164
   2.4 Standardization Committee ‘Quality Management, Statistics and Certification Elements (NQSZ) - Subcommittee 1 ‘Quality Management’ .................................................. 164
   2.5 Standardization Committee ‘Sachmerkmale’ (NSM) .......... 164
3. EUROPEAN 165
4. INTERNATIONAL 165
   4.2 ISO TC 184/SC 4/WG 5 „EXPRESS Language’ .................. 166
   4.3 ISO/TC 184/SC 4/WG 8 „Manufacturing Management Data’ (MANDATE) .................................................. 166
Contents

Chapter 9: Summary 167
References 169
Appendix A 175
Appendix B 187
Contents

2.4 EXPRESS for the Formal Description of the Modeling Language ......................................................... 29

3. INTEGRATION OF QUALITY MANAGEMENT 36
   3.1 Process-Oriented Integration of Quality Management ................................................................. 36
   3.2 Descriptive Rules for Quality Management .................................................................................. 38
   3.3 QM Elements as Process Modules .............................................................................................. 43
   3.4 Support of the Corporate QM System through Control Circuit Models and Process Models to Derive Indicators ................................................................. 46

4. REFERENCE MODELS AND MODEL LIBRARIES 49
   4.1 Introduction ................................................................................................................................ 49
   4.2 Reference Model 'Order Throughput' .......................................................................................... 50
   4.3 Model Library Quality Management ......................................................................................... 61

Chapter 4: Modeling Rules for Quality-Oriented Design of Business Processes 65

1. GOALS AND REQUIREMENTS OF MODELING RULES 65
   1.1 General Requirements of Modeling Rules .................................................................................. 66
   1.2 QM-typical Requirements of Modeling Rules ............................................................................. 66

2. APPROACHES TO QUALITY-ORIENTED MODELING 67
   2.1 Modeling Steps ........................................................................................................................... 67
   2.2 Ways to Quality-Oriented Modeling .......................................................................................... 69

3. GOAL FINDING AND SYSTEM DELIMITATION 72
   3.1 Goals ........................................................................................................................................... 72
   3.2 Determination of the Limits of a Model ....................................................................................... 72
   3.3 Determination of the Desired Level of Detail ............................................................................. 73

4. MODEL CREATION 74
   4.1 Goals and Desired Results ........................................................................................................... 74
   4.2 Identification of Objects and Object Classes to be Modeled ....................................................... 75
   4.3 Creation of Process Models .......................................................................................................... 75
   4.4 Creating QM-Related Process Models ...................................................................................... 77
   4.5 Creation of Information Models .................................................................................................. 81
   4.6 Creating QM-Related Information Models ................................................................................ 82
   4.7 Development of Specific Submodels ......................................................................................... 83

5. MODEL EVALUATION 83
   5.1 Targets and Possibilities of a Model Evaluation ........................................................................ 83
   5.2 Specification of Improvement Potentials in Quality Management .............................................. 84

6. MODEL MODIFICATION 86
   6.1 Targets and Desired Results ........................................................................................................ 86
   6.2 Determining the Base Model ....................................................................................................... 87
   6.3 Identifying the Modification Requirements of an Existing Model ........................................... 87
   6.4 Executing the Necessary Operations ......................................................................................... 88