

- Contributors p. ix
- Preface p. xiii
- Definitions p. xix
- Abbreviations, Nomenclature, Acronyms, and Symbols p. xxi
- Societies and Organizations p. xxxi
- 1 Overall Plant Design p. 1
- 1.1 Auditing Existing Plants for Upgrading p. 5
- 1.2 Project Management and Documentation p. 14
- 1.3 Operator Training, Commissioning, and Start-Up p. 29
- 1.4 Flowsheet Symbols and Functional Diagramming for Digitally Implemented Loops p. 42
- 1.5 Historical Data Storage and Evaluation p. 79
- 1.6 Integration of Process Data with Maintenance Systems p. 91
- 1.7 Applications, Standards, and Products for Grounding and Shielding p. 98
- 1.8 Concepts of Hierarchical Control p. 116
- 1.9 Analog or Discrete Input/Output, Costs and Signal Processing p. 123
- 1.10 Estimating the Costs of Control System Packages p. 142
- 2 Designing a Safe Plant p. 151
- 2.1 Hazardous Area Classification p. 156
- 2.2 Intrinsic Safety Rules for Fieldbus Installations p. 161
- 2.3 Purging and Inerting Systems p. 167
- 2.4 High-Integrity Pressure Protection Systems p. 173
- 2.5 Process Safety Management p. 182
- 2.6 Redundant or Voting Systems for Increased Reliability p. 192
- 2.7 Network Security p. 198
- 2.8 Safety Instrumented Systems: Design, Analysis, and Operation p. 209
- 2.9 Reliability Engineering Concepts p. 231
- 2.10 Intelligent Alarm Management p. 252
- 2.11 Safety Instrumentation and Justification of Its Cost p. 268
- 2.12 International Safety Standards and Certification (ANSI/ISA-S84, IEC 61511/61508/62061, ISO 13849) p. 278
- 3 Control Center, Workstation, and Logic Design p. 285
- 3.1 Operator Interface Evolution p. 288
- 3.2 Virtual Reality Tools for Testing Control Room Concepts p. 299
- 3.3 Upgrading the Control Room p. 307
- 3.4 Manufacturing Platforms and Workstations p. 323
- 3.5 Workstation Hosts: Design Concepts and Classification p. 327
- 3.6 Integration of DCS, PLC, HMI, and SCADA Systems p. 334
- 3.7 Integration with RTUs, Multiplexers, Fieldbuses, and Data Highways p. 341
- 3.8 Hybrid Systems with Discrete and Analog Capability p. 351
- 3.9 SCADA--Supervisory Control and Data Acquisition p. 357
- 3.10 PLC Programming p. 368
- 3.11 Fault-Tolerant Programming and Real-Time Operating Systems p. 387
- 3.12 Practical Logic Design p. 396
- 4 Buses and Networks p. 423

- 4.1 An Introduction to Networks in Process Automation p. 430
- 4.2 PLC Proprietary and Open Networks p. 442
- 4.3 Hardware Selection for Fieldbus Systems p. 465
- 4.4 Sorting Out the Protocols p. 478
- 4.5 Overall Fieldbus Trends p. 495
- 4.6 Fieldbus Advantages and Disadvantages p. 505
- 4.7 Fieldbus Design, Installation, Economics, and Documentation p. 513
- 4.8 Instrumentation Network Design and Upgrade p. 522
- 4.9 Global System Architectures p. 534
- 4.10 Advantages and Limitations of Open Networks p. 540
- 4.11 HART Networks p. 547
- 4.12 Foundation Fieldbus Network p. 564
- 4.13 PROFIBUS-PA p. 578
- 4.14 Designing PROFIBUS-PA and Foundation Fieldbus Segments p. 588
- 4.15 Ethernet and TCP/IP-Based Systems p. 601
- 4.16 Fieldbus Networks Catering to Specific Niches of Industry p. 612
- 4.17 Proprietary Networks p. 627
- 4.18 Fiber-Optic Networks p. 638
- 4.19 Satellite, Infrared, Radio, and Wireless LAN Networks p. 649
- 5 Software Packages p. 669
- 5.1 Control Loop Optimization p. 672
- 5.2 Data Reconciliation p. 687
- 5.3 Sequence of Event Recorders and Post-Trip Reviews p. 703
- 5.4 OPC Software Architecture p. 708
- 5.5 Batch Control State of the Art p. 714
- 5.6 Plantwide Control Loop Optimization p. 728
- 5.7 Plantwide Controller Performance Monitoring p. 749
- 5.8 The "Virtual Plant," A Tool for Better Understanding p. 761
- Appendix p. 773
- A.1 International System of Units p. 774
- A.2 Engineering Conversion Factors p. 784
- A.3 Chemical Resistance of Materials p. 807
- A.4 Composition of Metallic and Other Materials p. 813
- A.5 Steam and Water Tables p. 816
- A.6 Friction Loss in Pipes p. 824
- A.7 Tank Volumes p. 828
- A.8 Partial List of Suppliers p. 831
- Index p. 855