

# **Practical Industrial Data Communications**

**Best Practice Techniques**



**Deon Reynders  
Steve Mackay  
Edwin Wright**

# Practical Industrial Data Communications Best Practice Techniques

**Michael John Provost**



## **Practical Industrial Data Communications Best Practice Techniques:**

Practical Industrial Data Communications Deon Reynders, Steve Mackay, Edwin Wright, 2004-11-10 The objective of this book is to outline the best practice in designing installing commissioning and troubleshooting industrial data communications systems In any given plant factory or installation there are a myriad of different industrial communications standards used and the key to successful implementation is the degree to which the entire system integrates and works together With so many different standards on the market today the debate is not about what is the best be it Foundation Fieldbus Profibus Devicenet or Industrial Ethernet but rather about selecting the most appropriate technologies and standards for a given application and then ensuring that best practice is followed in designing installing and commissioning the data communications links to ensure they run fault free The industrial data communications systems in your plant underpin your entire operation It is critical that you apply best practice in designing installing and fixing any problems that may occur This book distills all the tips and tricks with the benefit of many years of experience and gives the best proven practices to follow The main steps in using today s communications technologies involve selecting the correct technology and standards for your plant based on your requirements doing the design of the overall system installing the cabling and then commissioning the system Fiber Optic cabling is generally accepted as the best approach for physical communications but there are obviously areas where you will be forced to use copper wiring and indeed wireless communications This book outlines the critical rules followed in installing the data communications physical transport media and then ensuring that the installation will be trouble free for years to come The important point to make is that with today s wide range of protocols available you only need to know how to select install and maintain them in the most cost effective manner for your plant or factory knowledge of the minute details of the protocols is not necessary An engineer s guide to communications systems using fiber optic cabling copper cabling and wireless technology Covers selection of technology and standards system design installation of equipment and cabling commissioning and maintenance Crammed with practical techniques and know how written by engineers for engineers

**Practical Telecommunications and Wireless Communications** Edwin Wright, Deon Reynders, 2004-10-16 The technology and structure of telecommunications networks has changed dramatically over the past few years These developments have changed the equipment you purchase the services you use the providers you can choose and the methods available for transporting data Practical Telecommunications and Wireless Communications for Engineers and Technicians will be of particular benefit to those who want to take full advantage of the latest and most effective telecommunications technology and services This book provides a grounding in the fundamentals of modern telecommunications systems in use in industrial engineering and business settings From networking for control systems to the use of Wireless LANs for enhanced on site communications systems This is a cutting edge book on the fundamentals of telecommunications for anyone looking for a complete understanding of the essentials of the terms jargon and technologies

used It has been designed for those who require a basic grounding in telecommunications for industrial engineering and business applications Gain an understanding of the fundamentals of modern industrial engineering and business telecommunications systems from networking for industrial control to the use of Wireless LANs for enhanced on site communications systems Learn to take full advantage of the latest and most effective telecommunications technology and services Provides a thorough grounding in the terms jargon and technologies involved in data communications *Practical Batch Process Management* Mike Barker, Jawahar Rawtani, 2004-11-18 Historically batch control systems were designed individually to match a specific arrangement of plant equipment They lacked the ability to convert to new products without having to modify the control systems and did not lend themselves to integration with manufacturing management systems *Practical Batch Management Systems* explains how to utilize the building blocks and arrange the structures of modern batch management systems to produce flexible schemes suitable for automated batch management with the capability to be reconfigured to use the same plant equipment in different combinations It introduces current best practice in the automation of batch processes including the drive for integration with MES Manufacturing Execution System and ERP Enterprise Resource Planning products from major IT vendors References and examples are drawn from DCS PLC batch control products currently on the market Implement modern batch management systems that are flexible and easily reconfigured Integrate batch management with other manufacturing systems including MES and ERP Increase productivity through industry best practice *Practical Centrifugal Pumps* Paresh Girdhar, Octo Moniz, 2011-04-18 *Practical Centrifugal Pumps* is a comprehensive guide to pump construction application operation maintenance and management issues Coverage includes pump classifications types and criteria for selection as well as practical information on the use of pumps such as how to read pump curves and cross reference Throughout the book the focus is on best practice and developing the skills and knowledge required to recognise and solve pump problems in a structured and confident manner Case studies provide real world scenarios covering the design set up troubleshooting and maintenance of pumps A comprehensive guide to pump construction design installation operation troubleshooting and maintenance Develop real world knowhow and practical skills through seven real world case studies Coverage includes pump classifications types and criteria for selection as well as practical information on the use of pumps **Practical Electrical Equipment and Installations in Hazardous Areas** Geoffrey Bottrill, Derek Cheyne, G Vijayaraghavan, 2005-02-15 This book provides the reader with an understanding of the hazards involved in using electrical equipment in Potentially Explosive Atmospheres It is based on the newly adopted international IEC79 Series of Standards that are now harmonizing and replacing older national Standards Explosion proof installations can be expensive to design install and operate The strategies and techniques described in this book can significantly reduce costs whilst maintaining plant safety The book explains the associated terminology and its correct use from Area Classification through to the selection of explosion protected electrical apparatus describing how protection is

achieved and maintained in line with these international requirements The IEC standards require that engineering staff and their management are trained effectively and safely in Hazardous Areas and this book is designed to help fulfill that need A basic understanding of instrumentation and electrical theory would be of benefit to the reader but no previous knowledge of hazardous area installation is required An engineer's guide to the hazards and best practice for using electrical equipment in Potentially Explosive Atmospheres Fully in line with the newly adopted international standards the IEC79 series Clear explanations of terminology and background information make this the most accessible book on this subject Practical Hydraulic Systems: Operation and Troubleshooting for Engineers and Technicians Ravi Doddannavar,Andries Barnard,Jayaraman Ganesh,2005-02-07 Whatever your hydraulic applications Practical Hydraulic Systems Operation Troubleshooting For Engineers Technicians will help you to increase your knowledge of the fundamentals improve your maintenance programs and become an excellent troubleshooter of problems in this area Cutaways of all major components are included in the book to visually demonstrate the components construction and operation Developing an understanding of how it works leads to an understanding of how and why it fails Multimedia views of the equipment are shown to give as realistic a view of hydraulic systems as possible The book is highly practical comprehensive and interactive It discusses Hydraulic Systems construction design applications operations maintenance and management issues and provides you with the most up to date information and Best Practice in dealing with the subject A focus on maintenance and troubleshooting makes this book essential reading for practising engineers Written to cover the requirements of mechanical industrial and civil engineering Cutaway diagrams demonstrate the construction and operation of key equipment *Practical Machinery Safety* David Macdonald,2004-07-16 Practical Machinery Safety aims to provide you with the knowledge to tackle machinery safety control problems at a practical level whilst achieving compliance with national and international standards The book highlights the major international standards that are used to support compliance with EU regulations and uses these standards as a basis for the design procedures It looks at the risk assessment processes used to identify hazards and to quantify the risks inherent in a machine It introduces the concepts of safety categories as defined by standard EN954 1 Safety of Machinery and illustrates the principles of failsafe design fault tolerance and self testing It also provides an introduction to machinery protection devices such as guards enclosures with interlocks and guard monitoring relays locking systems safety mats photo electric and electro sensitive principles and the application of light curtains a study of Safety Control System techniques and introduces the principles of safety certified PLCs Plan and implement safety systems that deliver a safe working environment and compliance with national and international standards Apply simple risk assessments and hazard design methods to your own projects Identify hazards that occur with machinery and know how to deal with them *Practical Power System Protection* Leslie Hewitson,Mark Brown,Ramesh Balakrishnan,2005-02-28 Designed to increase understanding on a practical and theoretical basis this invaluable resource provides engineers plant operators electricians

and technicians with a thorough grounding in the principles and practicalities behind power system protection Coverage of the fundamental knowledge needed to specify use and maintain power protection systems is included helping readers to increase plant efficiency performance and safety Consideration is also given to the practical techniques and engineering challenges encountered on a day to day basis making this an essential resource for all

*Practical Power Distribution for Industry* Jan De Kock,Cobus Strauss,2004-07-16 The book provides technical know how not covered by most universities and colleges in a subject that is central to the roles of many electrical engineers in industry focusing on switchgear power cables power factor correction and network studies Learn how to install and maintain electrical power equipment in industrial settings Select and specify the right power system at the right price Provides the practical essentials for reliable operation of industrial electrical networks covering switchgear cabling and power correction factors

**Practical Hazops, Trips and Alarms** David Macdonald,2004-07-16 Do you have trips and safety interlocks in your plant Are they good enough or are they perhaps over designed and much more expensive than necessary Are you or your company aware of how Hazard Studies should define risk reduction requirements Are you actually using Hazard Studies at all The answer is the integrated approach to safety management New international standards combined with well proven hazard study methods can improve safety management in your company Practical Hazops Trips and Alarms for Engineers and Technicians describes the role of hazard studies in risk management and then proceeds with basic training in Hazop techniques A number of practical exercises support the reference information and allow you to test your understanding of the material in the book This book aims to bridge the discipline gap between hazard studies and the provision of safety related alarm and trip systems It provides training in hazard and operability methods Hazops and in the principles of safety instrumented systems as defined by international standard IEC 61508 Design an integrated safety management system to increase efficiency and reduce costs Learn how to carry out hazard and operability studies Hazops and find out how to convert Hazop outputs into safety requirements specifications Implement safety instrumented systems to the new IEC standards IEC61508

Practical E-Manufacturing and Supply Chain Management Gerhard Greeff,Ranjan Ghoshal,2004-08-11 New technologies are revolutionising the way manufacturing and supply chain management are implemented These changes are delivering manufacturing firms the competitive advantage of a highly flexible and responsive supply chain and manufacturing system to ensure that they meet the high expectations of their customers who in today s economy demand absolutely the best service price delivery time and product quality To make e manufacturing and supply chain technologies effective integration is needed between various often disparate systems To understand why this is such an issue one needs to understand what the different systems or system components do their objectives their specific focus areas and how they interact with other systems It is also required to understand how these systems evolved to their current state as the concepts used during the early development of systems and technology tend to remain in place throughout the life cycle of the systems technology This

book explores various standards concepts and techniques used over the years to model systems and hierarchies in order to understand where they fit into the organization and supply chain It looks at the specific system components and the ways in which they can be designed and graphically depicted for easy understanding by both information technology IT and non IT personnel Without a good implementation philosophy very few systems add any real benefit to an organization and for this reason the ways in which systems are implemented and installation projects managed are also explored and recommendations are made as to possible methods that have proven successful in the past The human factor and how that impacts on system success are also addressed as is the motivation for system investment and subsequent benefit measurement processes Finally the vendor user supply demand within the e manufacturing domain is explored and a method is put forward that enables the reduction of vendor bias during the vendor selection process The objective of this book is to provide the reader with a good understanding regarding the four critical factors business physical processes systems supporting the processes company personnel and company personal performance measures that influence the success of any e manufacturing implementation and the synchronization required between these factors Discover how to implement the flexible and responsive supply chain and manufacturing execution systems required for competitive and customer focused manufacturing Build a working knowledge of the latest plant automation manufacturing execution systems MES and supply chain management SCM design techniques Gain a fuller understanding of the four critical factors business and physical processes systems supporting the processes company personnel performance measurement that influence the success of any e manufacturing implementation and how to evaluate and optimize all four factors

**Practical Grounding, Bonding, Shielding and Surge Protection** G Vijayaraghavan, Mark Brown, Malcolm Barnes, 2004-07-21 This book will allow you to gain practical skills and know how in grounding bonding lightning surge protection Few topics generate as much controversy and argument as that of grounding and the associated topics of surge protection shielding and lightning protection of electrical and electronic systems Poor grounding practice can be the cause of continual and intermittent difficult to diagnose problems in a facility This book looks at these issues from a fresh yet practical perspective and enables you to reduce expensive downtime on your plant and equipment to a minimum by correct application of these principles Learning outcomes Apply the various methods of grounding electrical systems Detail the applicable national Standards Describe the purposes of grounding and bonding List the types of systems that cannot be grounded Describe what systems can be operated ungrounded Correctly shield sensitive communications cables from noise and interference Apply practical knowledge of surge and transient protection Troubleshoot and fix grounding and surge problems Design install and test an effective grounding system for electronic equipment Understand lightning and how to minimize its impact on your facility Protect sensitive equipment from lightning An engineer's guide to earthing shielding lightning and surge protection designed to deliver reliable equipment and communications systems that comply with international and national codes Discover how to

reduce plant downtime and intermittent faults by implementing best practice grounding earthing techniques Learn the principles of cable shielding in communication networks      Practical Machinery Vibration Analysis and Predictive Maintenance Cornelius Scheffer, Paresh Girdhar, 2004-07-16 Machinery Vibration Analysis and Predictive Maintenance provides a detailed examination of the detection location and diagnosis of faults in rotating and reciprocating machinery using vibration analysis The basics and underlying physics of vibration signals are first examined The acquisition and processing of signals is then reviewed followed by a discussion of machinery fault diagnosis using vibration analysis Hereafter the important issue of rectifying faults that have been identified using vibration analysis is covered The book also covers the other techniques of predictive maintenance such as oil and particle analysis ultrasound and infrared thermography The latest approaches and equipment used together with the latest techniques in vibration analysis emerging from current research are also highlighted Understand the basics of vibration measurement Apply vibration analysis for different machinery faults Diagnose machinery related problems with vibration analysis techniques      Mechatronic Systems and Process Automation Patrick O.J. Kaltjob, 2018-03-09 The book discusses the concept of process automation and mechatronic system design while offering a unified approach and methodology for the modeling analysis automation and control networking monitoring and sensing of various machines and processes from single electrical driven machines to large scale industrial process operations This step by step guide covers design applications from various engineering disciplines mechanical chemical electrical computer biomedical through real life mechatronics problems and industrial automation case studies with topics such as manufacturing power grid cement production wind generator oil refining incubator etc Provides step by step procedures for the modeling analysis control and automation networking monitoring and sensing of single electrical driven machines to large scale industrial process operations Presents model based theory and practice guidelines for mechatronics system and process automation design Includes worked examples in every chapter and numerous end of chapter real life exercises problems and case studies      **Servitization and Physical Asset Management** Michael John Provost, 2018-12-31 Servitization and Physical Asset Management third edition was developed to provide a structured source of guidance and reference information on the business opportunities linked to servitization and the management of physical assets A growing trend in the global economy servitization focuses on the actual deliverables of an asset from the perspective of the customer electricity instead of the power plant thrust instead of the engine mobility instead of a plane or a car The book offers high level overviews of how to servitized and manage assets from a variety of perspectives reviewing nearly 1 500 books magazine articles papers and presentations and websites Written by Michael J Provost Ph D and a subject matter expert in modeling simulation analysis and condition monitoring Servitization and Physical Asset Management third edition is an invaluable reference to those considering providing asset management services for the products they design and manufacture It is also meant to support middle management wishing to know what needs to be done to look after the assets



they are responsible for and who to approach for help and academics doing research in this field Michael Provost is a British engineer with a doctoral degree in thermal power from Cranfield University      **Industrial Engineering and Applications**

Loon-Ching Tang,2023-08-15 The field of industrial engineering IE has a very wide scope from production processes and automation to supply chain management but the scope of IE techniques has expanded beyond the traditional domains of application and is now relevant to areas that matter most to society at large This book presents the proceedings of ICIEA 2023 the 10th International Conference on Industrial Engineering and Applications held in Phuket Thailand from 4 to 6 April 2023 The conference was conducted in hybrid mode with close to 100 delegates attending in person and about 50 participants attending online A total of 272 submissions were received for the conference of which 120 were accepted for presentation with 83 of those published here as full papers These papers cover a wide range of topics within the scope of industrial and systems engineering including but not limited to supply chain and logistics quality and reliability advanced manufacturing and production scheduling to ergonomics and man machine systems interfaces In particular a significant number of papers are devoted to machine learning techniques and applications beyond the traditional manufacturing sector to include healthcare sustainability assessment and other social issues Offering an overview of recent research and novel applications the book will be of interest to all those whose work involves the application of industrial engineering techniques

*Power Systems Protection, Power Quality ,      Process Control ,      Practical Data Communications for Instrumentation and Control* John Park,Steve Mackay,Edwin Wright,2003-07-28 Overview of Data Communications Basic Data Communication Principles Physical Serial Communication Standards Error Detection Cabling Basics Electrical Noise and Interference Modems and Multiplexers Introduction to Protocols Open Systems Interconnection Model Industrial Protocols HART Protocol Open Industrial Fieldbus and DeviceNet Systems Local Area Networks Appendix A Numbering Systems Appendix B Cyclic Redundancy Check CRC Program Listing Appendix C Serial Link Design Glossary      Redes de comunicaciones industriales Nuria OLIVA ALONSO,Vvaa,2013-03-01 Este libro es el resultado de la colaboraci n de un grupo de profesores de cinco universidades p blicas espa olas Constituye un texto fundamental que proporciona a los estudiantes e interesados en las comunicaciones industriales suficientes herramientas habilidades y competencias b sicas para poder desenvolverse en estos entornos con garant as

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