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# BEST PRACTICE IN INDUSTRIAL DATA COMMUNICATIONS



## WHAT YOU WILL LEARN:

- Best practice in industrial data communications design, installation and commissioning
- How to design and install your own fully operational industrial data communications systems
- How to integrate different industrial communications protocols and standards into a complete working system

## WHO SHOULD ATTEND:

Anyone working with or required to follow best practice in the installation of industrial data communications systems ranging from RS-232 to Fieldbus and Ethernet systems, including:

- Instrumentation and Control Engineers and Technicians
- Process Control Engineers
- Network Planners
- Electrical Engineers
- Test Engineers
- System Integrators
- Designers
- Electronic Technicians
- Consulting Engineers
- Design Engineers
- Plant Managers
- Systems Engineers
- Shift Electricians

## The Workshop

The objective of this workshop 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 workshop distils all the tips and tricks learnt 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.

Fibre 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 workshop 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.

## Practical Sessions

- Troubleshooting RS-232
- Troubleshooting RS-485
- Troubleshooting Modbus
- Troubleshooting Ethernet
- Troubleshooting TCP/IP
- Checking RS-485 behaviour at different frequencies
- Fabricating and testing Cat5 cables

## The Program

### INTRODUCTION

- Overview of the workshop
- OSI model
- Systems engineering approach
- Attributes of typical communications systems
  - Media
  - Physical connections
  - Protocols and applications
- General issues
  - Noise, earthing and shielding
  - Protection against dust and moisture

### FUNDAMENTALS

- Copper/fiber
  - Cable and connector standards
  - Splicing
  - Connector attachment
  - Drivers and detectors
  - Earthing and termination
  - Protection against transients
- Physical layer standards
  - RS-232
  - RS-485
  - 4-20 mA
- Industrial networks
  - Industrial Ethernet
  - AS-i
  - DeviceNet
  - Profibus
  - Foundation Fieldbus
  - Modbus Plus
  - Data Highway Plus
  - HART
  - Ethernet/IP
  - ProfiNet
  - Foundation Fieldbus HSE
- Industrial protocols
  - TCP/IP
  - Modbus and Modbus TCP
  - DNP3
  - 60870 SCADA

### SELECTION METHODOLOGY

- Which standards/technologies to use:
  - Field management (device) level
  - Process management (operator) level
  - Business management (enterprise) level
  - Long distance SCADA/telemetry links

### INSTALLATION METHODOLOGY

- Copper cabling and connectors
  - System design and installation
- Fibre cabling and connectors
  - System design and installation
- Wireless
  - System design and installation

### COMMISSIONING, TESTING AND TROUBLESHOOTING

- Copper infrastructure
- Fibre infrastructure
- Wireless infrastructure
- Networks
  - Physical layer issues (OSI Layer 1)
  - Data link layer issues (OSI Layer 2)
  - Network layer issues (OSI Layer 3)
  - Transport layer issues (OSI Layer 4)
  - Application and "user" layer issues (OSI Layers 7-8)
  - Client/server issues

### SUMMARY, OPEN FORUM AND CLOSING