PRACTICAL TROUBLESHOOTING, DESIGN AND SELECTION OF INDUSTRIAL FIBRE OPTIC SYSTEMS FOR INDUSTRY

YOU WILL LEARN:

- Practical hands-on experience in jointing, splicing and testing fibre optic systems
- A solid knowledge of fibre optic communications systems
- State of the art fibre optics technology and installation practices
- Correct procedures for cable installation and termination
- How to design and install your own fully operational fibre optics system
- New approaches to troubleshooting including how to use an Optical Time Domain Reflectometer (OTDR)

WHO SHOULD ATTEND:

- Instrumentation and Control Engineers and Technicians
- Telecommunications Engineers and Technicians
- Maintenance Engineers and Technicians
- Process Control Engineers
- Project Engineers
- Electrical Engineers
- Consulting Engineers
- Systems Engineers
- Project Managers
- Electricians

The Workshop

This is a comprehensive two-day workshop that provides the necessary background to understand the fundamentals of fibre optic systems and their individual components including fibres, cable construction, connectors, splices and optical sources and detectors. Attendees will use this knowledge to develop the required techniques for design, installation and maintenance of fibre optic systems.

The workshop places significant emphasis on the practical techniques of component installation and system design. Attendees will have the opportunity to get hands on experience with mechanical and fusion splicing and with fitting the popular industrial fibre connectors. A fibre optic link design software package is provided to allow the attendee to practice actual link design practicals using various parameters. Finally, attendees will have the opportunity to practice using various Fibre Optic test equipment such as optical sources and power meters.

The material presented in this workshop has been developed from the many years experience gained by IDC Technologies' engineers working in consulting and contracting roles in industry. It is a practical, hands-on workshop enabling participants to work through practical exercises which reinforce the concepts discussed during the workshop.

Workshop Objectives

This workshop is designed to provide a thorough background to fibre optic communications systems and to illustrate how to design and install these systems. Various pitfalls associated with the implementation of fibre optic systems are discussed and workable solutions to these problems are provided. It will benefit engineers and technicians involved in specifying, commissioning and maintaining industrial fibre optic systems, but who have little previous experience in this field.

Practical Sessions

- Fibre Optic Link Design - a complete design of a fibre optic link
- Bit Error Rate - perform simple tests and examine the practical implications of the results
- Fusion Splicer - perform a fusion splice and gain experience in the techniques
- Mechanical Splice - perform a simple mechanical splice
- Optical Power Measurement - the use of an optical source and an optical power meter
- Continuity Tester - the principles of operation of a simple fibre optic continuity tester
- Optical Time Domain Reflectometer (OTDR) - demonstration on the practical use of ODTR with a video presentation

The Program

INTRODUCTION TO FIBRE OPTIC SYSTEMS

- Introduction
- Outline of workshop
- Historical background to fibre optics
- Comparison of fibre optics and copper systems

DEFINITIONS AND BASIC PRINCIPLES

- Data communications
- Communications channels
- Transmission modes
- The electromagnetic spectrum
- Revisiting copper

THEORY OF FIBRE OPTIC TRANSMISSION

- Fundamental principles of operation
- Light transmission nature of glass
- Numerical aperture
- Modal propagation in fibres
- Multimode / singlemode / step-index / graded index
- Bandwidth of fibres
- Modal and chromatic dispersion
- Absorption / scatter / bending / radiation / mismatches
- Other types of fibres

CONSTRUCTION OF FIBRE OPTIC CABLES

- Cable objectives
- Tensile ratings
- Structural elements
- Strengthening members
- Housings - loose tube / slotted core / tight buffered
- Sheaths and moisture barriers
- Classes of cables - aerial / underground / subaqueous / indoor

CONNECTING FIBRES

- Optical connection issues
- Fibre end preparation
- Splicing fibres - fusion / mechanical
- Connectors
- Optical couplers

OPTICAL DRIVERS AND DETECTORS

- Light emitting diodes
- Lasers
- Transmitter modules
- Safety considerations
- PIN photodiodes
- Receiver modules
- Optical amplifiers

INSTALLING FIBRE OPTIC CABLES

- Preparation - site survey and design
- Installation rules and procedures
- Bending radius / cable tension / cable reels
- Cable trays / conduits / lubricants
- Indoor cable installation / leaving extra cable
- Outdoor cable installation / environmental conditions
- Splicing trays / organisers / termination cabinets / patch panels / distribution panels / breakout boxes

FIBRE OPTIC SYSTEM DESIGN

- Initial design considerations
- Future capacity / reliability / operating wavelength
- Repeaters and amplifiers
- Design loss calculations / link loss budgets
- Design bandwidth calculations

TESTING OF FIBRE OPTIC SYSTEMS

- Concepts of optical measurement
- Continuity testing
- Insertion loss testing
- Optical Time Domain Reflectometry (OTDR)
- Bit Error Rate (BER) testing
- Eye diagrams
- Laboratory fibre tests

TECHNOLOGIES THAT USE OPTICAL FIBRES

- Low speed modems
- 10 Base F / FDDI / FIORL
- 100 Base F
- ATM
- LANs / MANs / WANs
- Analog modulators for video and microwave links
- HDTV