

Hands-On

Fiber Optics for Today's Industry Applications

(A Non-Telephone Company Course)



Course Description

This Hands-On course is designed to provide technicians with a practical understanding and Hands-On Experience of fiber optic theory and fiber optic applications.

This would include using Fiber Optics for

- Digital Control Systems (DCS)
- Networks (LANS/WANS/CANS/MANS)
- Security & Traffic Systems
- Closed Circuit TV systems
- Industrial Manufacturing Monitoring Equipment
- Data and Voice Networks
- Multitude of Other Fiber Applications

This in-depth course focuses on a wide array of Fiber Optic systems and components and will focus on installation, splicing, connectorization, testing and maintenance techniques that will prepare each student to skillfully work with fiber optics in a wide variety of commonly found work conditions. This course relies heavily on hands-on exercises and student participation. It begins with an explanation of light and fiber optic theory and then moves on to Hands-On and practical applications of installing and maintaining a complete fiber system.

Students Will Learn

- **The History Of Fiber Optics & Evolution Of Fiber Systems.**
- **Fiber Optic Theory And Waveguide Functions.**
- **Singlemode And Multimode Fiber Types.**
- **The Causes Of Attenuation, Optical Reflection And Refraction.**
- **Optical Dispersion Characteristics And Pulse Spreading Issues.**
- **Loose Tube And Unitube Style Trunk Cables**
- **Distribution And Feeder Cables.**
- **Fusion Splicer Applications And Fiber Alignment Systems**
- **Mechanical Splicing Uses And Applications**
- **Optical Connector Styles And Applications**
- **Back Reflection Issues And Angled Physical Contact Connectors**
- **Patch Panels And Functions For Distribution And Transmission**
- **Splice Closure Styles And Function**
- **Drop Cable Connectivity And Security**
- **Safety Practices**

- **Intro To Optical Testing And Troubleshooting.**
- **Visible Light Sources, OTDRs And Power Meters**
- **Testing Methods For Singlemode And Multimode Fiber Systems**
- **OTDR Test Functions And Trace Interpretation**
- **Optical Loss Testing Methods**
- **And More**

Target Audience

Inside /Outside, Plant technicians, contractors, union craftsman, electricians, technicians, installers, splicers, engineers, facilities managers, managers and anyone involved in repairing, installing, maintaining, designing, evaluating, or provisioning Fiber Optic Cables and Optical Networks.

Prerequisites

None.

Course Outline

MODULE #1 FIBER OPTIC GENERAL STUDIES REVIEW

I. INTRODUCTION

Common Industry Terminology

History of Fiber Optics

Advantages/Disadvantages of Fiber Optics

Basics of a Fiber Optic Communications System

Typical Transmission Rates for Voice, Video & Data Applications

System Topologies

Fiber Optic Standards

And More...

II. THEORY TOPICS

- Theory of Light
- Electromagnetic Spectrum
- Total Internal Reflection (Singlemode)
- Refraction (Multimode)
- Index of Refraction (Refractive Index)
- Light Sources (LEDs & LASERs)
- Wave Division Multiplexing (WDM)
- Optical Switching Fundamentals
- And More...

III. FIBER TOPICS

- Optical Fiber Types
- Typical Fiber Specifications
- Multimode Optical Fibers
- Singlemode Optical Fibers
- Dispersion Characteristics
- Modal Dispersion
- Chromatic Dispersion
- And More...

IV. FIBER CABLE TYPES

- Outside Plant
- Inside Plant
- Loose tube Gel Filled
- Tight Buffered Distribution
- Tight Buffered Breakout
- Jumper Cables and Hybrids styles
- Reverse Oscillation Locator
- Fiber Color Code
- And More...

MODULE #2

FIBER OPTIC SAFETY ISSUES

SAFETY FIRST

- LASER Safety and Warning labels
- Types of LASERs
- LASER Output Power Levels
- Eye Safety Precautions
- Safe Glass Disposal Practices
- Food and Drinks Not Safe
- Proper Person Cleanliness
- Safe Work Surroundings
- Confined Spaces Issues

And More...

MODULE #3 FIBER OPTIC CABLE INSTALLATION

PROPER PLANNING

Project Considerations
Cable Pre-testing
Cable Reels Identification and Handling
Proper Cable Pulling Techniques
Outdoor Cable Design Characteristics
Cable Pulling Specifications
Tensile Strength and Bend Radius
Avoiding Installation Obstacles
Grounding and Bonding Fiber Cables
Identifying Cable Types
Work Area Protection Issues
And More...

MODULE #4 CONNECTORIZATION

INSTALLING AND TESTING CONNECTORS

- How to inspect connector endface
- Proper handling and cleaning connectors
- Install connector on 900u buffer

- Install connector on 3mm patchcord
- How to test connectors with PM & LS

MODULE #4

FIBER OPTIC TESTING

ADVANCED TESTING INFORMATION

The dB Scale and Units of Loss

OTDR Functions for Testing

OTDR Testing for Splices, Distances and Back Reflection

OTDR Trace Guidelines

The Dead Zone

Trace Events and Interpretation

Testing at Various Wavelengths

System Loss Parameters

Calculating System Loss

Total System OTDR Testing

Optical Loss Test Sets (OLTS)

Referencing the Test Set First

Measuring Cable System Loss

Documenting Test results

And more...

Notes

Hands-On Labs

Safety Concerns with Hands-on Practices
Cable Types (Uni-tube & Loose Tube)
Practice Safe Cable Preparation Techniques

Various Closure Types
Practice Closure Preparation
Install Prepared Cable into Closure
Practice Fiber Routing to Splice Trays
Patch Panel Types and Fiber Dressing
Fusion Splicer Types and Operations
Mechanical Splice (Fiber Lok)
Precision Cleaver Operation
Set-up Fusion Splicer and Cleaver Work Stations
Practice Fiber Stripping, Cleaning and Cleaving
Practice In-Line Fusion Splicing
Practice Pigtail Fusion Splicing
Qualify Acceptable Fusion Splices
OTDR Operation and Theory
Practice OTDR Set-up Procedures
Practice OTDR Splice and Connector Testing
Measure Fiber Lengths, Events and Losses
Measure Reflectance for Acceptance
Install and Polish connectors
Inspect connector endface
Proper procedures for handling connectors
Perform loss testing with OTDR
Perform loss testing with Power meter & Light Source
Practice Troubleshooting Techniques
And more

Delivery Method

Instructor-Led with numerous Hands-On Labs and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

3 Days