Industrial Data Communications Troubleshooting Course

28 March – 1 April 2027
Johannesburg

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Training Center

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Industrial Data Communications Troubleshooting Course

Ref: 863_165247 **Date:** 28 March – 1 April 2027 **Location:** Johannesburg **Fees:** 4500 Euro

Overview

Industrial Data Communications Troubleshooting Course is a one-week course for automation, instrumentation, maintenance, and control professionals who leave with an Industrial Communications Fault-Isolation Pack. Participants trace signals, compare serial and Ethernet paths, interpret Modbus, PROFINET, and EtherNet/IP exchanges, validate addressing and topology, capture diagnostic evidence, and isolate failures. The course replaces trial-and-error replacement with a layered test sequence and restoration record. Agile Leaders Training Center develops industrial data communications troubleshooting practice.

Who Should Attend

- Automation functions responsible for communication between controllers, remote devices, and supervisory systems
- Instrumentation functions responsible for field interfaces, signals, and device data paths
- Maintenance functions responsible for diagnosing intermittent or persistent network faults
- Control functions responsible for commissioning industrial Ethernet and serial communications
- Operations technology support functions responsible for availability, changes, and incident evidence

The course assumes participants can identify industrial control components and use basic electrical test tools; it leaves out vendor programming, enterprise routing design, radio engineering, and penetration testing.

Departments and Industries

The course supports departments and industries that rely on operational data exchange between industrial devices.

- Automation, instrumentation, control, electrical maintenance, and operations technology
- Manufacturing, process industries, utilities, and water operations
- Logistics, transport systems, facilities, and infrastructure
- Energy services, food processing, pharmaceuticals, and building operations

Learning Objectives

By the end of this course, participants will be able to:

- Use a layered communication map to locate a suspected fault domain.
- Analyze serial frames, addressing, timing, and termination evidence.
- Build and validate an industrial Ethernet topology and address plan.
- Compare Modbus, PROFINET, and EtherNet/IP diagnostic behavior.
- Diagnose media, switch, device, and application-layer failures.
- Evaluate restoration evidence and operational security boundaries.

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Course Agenda

Day 1: Map the Communication Path

- Industrial Communications Layer and Device Path Map
- Signal, Bandwidth, Noise, and Timing Evidence Sheet
- Copper, Fiber, and Interface Selection Matrix
- Network Topology and Failure-Domain Diagram
- Baseline Availability and Change Record

Day 2: Test Serial and Modbus Links

- Serial Interface Wiring and Reference Checklist
- Termination, Biasing, Shielding, and Grounding Test
- Modbus RTU Address and Function-Code Map
- Request, Response, Timeout, and Exception Trace
- Serial Fault Isolation Decision Tree

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Day 3: Validate Industrial Ethernet

- MAC, IP, Subnet, and Gateway Address Plan
- Managed Switch Port and Link-State Register
- Modbus TCP Transaction and Connection Trace
- PROFINET Device Name and Diagnostic Record
- EtherNet/IP and CIP Connection Path Map

Day 4: Diagnose Reliability and Boundaries

- Packet Capture Filter and Evidence Sequence
- Latency, Jitter, Loss, and Cycle-Time Comparison
- Redundancy, Segmentation, and Recovery Test Plan
- Operational Security Zone and Remote-Access Boundary Map
- Commissioning Acceptance and Restoration Log

Day 5: Practice Fault Isolation

- Exercise: Repair a Serial Wiring and Timing Fault
- Exercise: Diagnose a Modbus Address and Exception Failure
- Exercise: Trace an Industrial Ethernet Connectivity Fault
- Exercise: Validate Recovery and Security Boundaries
- Capstone: Industrial Communications Fault-Isolation Pack

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Practical Exercises

The course uses suggested activities based on controller, instrument, drive, gateway, and supervisory-system communication paths.

- Suggested activity: trace a physical and logical path, record baseline evidence, and identify the probable failure domain.
- Suggested activity: inspect a serial exchange and distinguish wiring, timing, addressing, and application exceptions.
- Suggested activity: validate an Ethernet address plan, switch ports, protocol endpoints, and packet evidence.
- Suggested activity: restore a communication path and document acceptance, recovery, and operational security boundaries.

FAQs

Who suits industrial data communications troubleshooting, and what does it assume?

Automation, instrumentation, maintenance, control, and operations technology functions suit the course. It assumes familiarity with industrial devices and basic electrical testing.

How does industrial data communications troubleshooting differ from general networking training?

Industrial troubleshooting focuses on controllers, instruments, deterministic exchanges, serial interfaces, field protocols, cycle behavior, commissioning evidence, and production restoration, while general networking training usually emphasizes office and enterprise services.

How are Modbus RTU and Modbus TCP faults distinguished?

Modbus RTU faults are tested through serial media, electrical references, timing, frames, addresses, and checks, while Modbus TCP adds Ethernet links, IP addressing, TCP connections, switch behavior, and transaction evidence.

What evidence helps diagnose PROFINET and EtherNet/IP communication faults?

Useful evidence includes physical link state, device identity, address configuration, topology, controller status, protocol diagnostics, connection state, packet captures, timing, loss, and recent changes.

How should industrial communications be restored safely?

Restoration should follow an approved change boundary, preserve diagnostic evidence, correct the smallest proven fault domain, test normal and recovery behavior, and record the accepted configuration.

Conclusion

Participants take back an Industrial Communications Fault-Isolation Pack containing path maps, baseline records, protocol traces, diagnostic tests, boundary checks, and restoration evidence. It changes communication repair from component substitution into layered diagnosis. The pack supports repeatable commissioning, faster fault localization, controlled recovery, and documented handover.