QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 1514

PLC Programming & Industrial Automation Training Course

INDUSTRIAL AUTOMATION & DIGITAL TECHNOLOGIES
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The PLC Programming & Industrial Automation Training Course provides a comprehensive and practical framework for understanding, designing, programming, operating, troubleshooting, and optimizing Programmable Logic Controller systems used in modern industrial environments. The course focuses on developing the technical capabilities required to translate industrial process requirements into structured, reliable, and maintainable control programs while integrating controllers with instrumentation, sensors, motors, actuators, and production equipment.

The course covers the fundamental architecture of Programmable Logic Controllers, including processors, memory, input and output modules, communication modules, power supplies, and programming environments. It also addresses the core principles of industrial programming, control logic, sequential operations, interlocking, timers, counters, and digital and analog signal processing, enabling participants to develop organized control programs suitable for real industrial applications.

A strong practical emphasis is placed on control logic development, industrial process programming, troubleshooting, and performance improvement. Participants examine PLC applications in production lines, pumps, motors, conveyors, material handling systems, and sequential processes, together with communication between PLCs, instrumentation, Human-Machine Interfaces, and industrial networks.

The course also addresses advanced industrial automation concepts, fault diagnosis, maintenance, program reliability, change management, and industrial control system cybersecurity. Through practical exercises and industrial scenarios, participants will develop the ability to analyze automation requirements, design and test PLC programs, diagnose operational problems, and develop practical solutions that support productivity, safety, reliability, and operational continuity.

Objectives

- Analyze PLC architecture, components, operating principles, and functions during the first day of the course.
- Evaluate industrial process requirements and translate them into programmable control logic and operating sequences.
- Apply industrial programming principles using logical instructions, timers, counters, and interlocking functions.

- Design structured PLC control programs for industrial processes using digital and analog signals.
- Apply appropriate methods for handling input and output modules, sensors, actuators, and motors within industrial control systems.
- Develop PLC programs for sequential processes, industrial equipment, and automated production lines.
- Evaluate communication requirements between PLCs, HMIs, instrumentation, and industrial networks.
- Apply systematic methods for testing PLC programs, diagnosing faults, and identifying root causes of operational problems.
- Develop maintenance and change-management procedures to improve PLC program reliability and system performance.
- Prepare an actionable plan for developing or improving an industrial automation system based on PLC technology.

Who Should Attend

The PLC Programming & Industrial Automation Training Course is designed for engineers, technicians, and professionals working in industrial automation, industrial control, electrical engineering, instrumentation and control, maintenance, production, manufacturing, and operational technology. It is particularly relevant to control engineers, automation engineers, electrical engineers, instrumentation engineers, PLC engineers, automation technicians, control system specialists, and professionals involved in the design, operation, programming, maintenance, and optimization of automated industrial systems.

The course is also suitable for plant managers, operations managers, engineering managers, maintenance managers, production managers, automation managers, reliability professionals, industrial project managers, and operations supervisors. It is highly relevant to executives and decision makers within government entities, ministries, public-sector organizations, oil and gas companies, energy organizations, utilities, manufacturing facilities, water and wastewater organizations, and large industrial corporations seeking to strengthen PLC programming capabilities, improve industrial automation performance, increase control system reliability, and support safe and efficient operations.

Learning Outcomes

- Explain the architecture, components, and fundamental operating principles of Programmable Logic Controllers.
- Identify and apply digital and analog signals within industrial control systems.
- Analyze industrial process requirements and convert them into control logic and sequential operating procedures.
- Design structured PLC programs using logical instructions, timers, counters, and interlocking functions.
- Develop PLC programs for motors, pumps, conveyors, production equipment, and sequential industrial processes.
- Configure and evaluate input and output modules, sensors, and actuators within an industrial automation environment.
- Assess communication requirements between PLCs, Human-Machine Interfaces, instrumentation, and industrial networks.
- Test PLC programs systematically and identify programming, input/output, communication, and operational faults.
- Develop maintenance, backup, and change-management procedures for PLC-based control systems.
- Develop a practical industrial automation project concept based on PLC technology with defined control requirements, testing procedures, maintenance considerations, and performance indicators.

Course Outline

DAY 01

PLC Fundamentals and Industrial Automation Architecture

- Introduction to Programmable Logic Controllers and industrial automation
- Evolution of automated industrial control systems
- PLC architecture and major components
- CPU, memory, input and output modules
- Power supplies and communication modules
- Digital and analog signals

DAY 01 — CONTINUED

- Sensors, actuators, motors, and field devices
- PLC scan cycle and program execution
- Principles of industrial control system design

PRACTICAL APPLICATION

Analyze an industrial process and identify the required PLC architecture, field devices, input/output requirements, and control functions

DAY 02

PLC Programming and Control Logic

- Fundamentals of PLC programming
- Basic logical instructions and control operations
- Designing control circuits and PLC logic
- Timers and counters
- Interlocking and protection functions
- Motor, pump, and equipment control
- Digital and analog signal processing
- Sequential industrial control
- Structured and maintainable PLC programming

PRACTICAL APPLICATION

Develop a PLC control program for a sequential industrial process and analyze the operating logic

DAY 03

Advanced PLC Applications and System Integration

- PLC applications in automated production lines
- Conveyor and material handling control
- Pump and motor control systems
- Sequential process automation

DAY 03 — CONTINUED

- Analog signal processing and scaling
- Fundamentals of motion control
- PLC integration with instrumentation
- PLC and HMI integration
- Industrial communication and networking

PRACTICAL APPLICATION

Design an integrated PLC control system for a production process and connect the controller with instrumentation and an operator interface

DAY 04

PLC Testing, Troubleshooting, and Maintenance

- PLC program testing methodologies
- Verifying control logic and operating sequences
- PLC program diagnostics
- Input and output fault diagnosis
- Industrial communication and network troubleshooting
- Sensor and actuator fault analysis
- Motor and equipment troubleshooting
- Preventive maintenance for PLC-based control systems
- Program backup and change management

PRACTICAL APPLICATION

Analyze a simulated PLC system failure, identify the root cause, and develop corrective and preventive actions

DAY 05

Automation Optimization, Reliability, and Project Development

- Evaluating PLC and industrial automation performance
- PLC program optimization

DAY 05 — CONTINUED

- Program organization and maintainability
- Control system reliability
- PLC software lifecycle management
- Industrial control system cybersecurity fundamentals
- Operational continuity and system recovery
- Automation performance indicators
- Industrial automation project planning

FINAL WORKSHOP

Design a complete PLC-based industrial automation project covering control requirements, programming, system integration, testing, maintenance, cybersecurity, reliability, and performance measurement

Register or Request More Information

Course page: https://quest-training.com/courses/plc-programming-industrial-automation-training-course
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