# Advanced PLC Programming in Manufacturing Training Course

Professional Development Training Course Outline

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|---|---|---|---|
| **Category** | Manufacturing | **Duration** | 10 Days |
| **Base Fee** | $3,000 USD | **Delivery Mode** | Online / On-site Hybrid |

## Course Introduction

The Advanced PLC Programming in Manufacturing Training Course is designed to equip engineers, technicians, and automation professionals with high-level expertise in industrial automation, PLC ladder logic, SCADA integration, and smart manufacturing systems. As modern factories transition toward Industry 4.0, IIoT (Industrial Internet of Things), and digitalized production environments, the demand for advanced PLC programming skills continues to grow rapidly. Advanced PLC Programming in Manufacturing Training Course provides deep hands-on exposure to leading PLC platforms such as Siemens, Allen-Bradley, and Schneider Electric, enabling learners to design, troubleshoot, and optimize complex automated systems used in manufacturing industries like automotive, food processing, pharmaceuticals, and energy production.

This training emphasizes real-world industrial applications including HMI/SCADA systems, motion control, PID loops, industrial networking (Profinet, Modbus, Ethernet/IP), and fault diagnostics in automated production lines. Participants will learn how to develop robust, scalable, and efficient PLC programs that enhance productivity, reduce downtime, and improve system reliability. By integrating predictive maintenance, digital twin concepts, and smart sensor technologies, this course bridges the gap between traditional automation and next-generation smart manufacturing ecosystems, making learners industry-ready for high-demand automation roles.

## Programme Curriculum

**Advanced PLC Programming in Manufacturing Training Course**

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**Course Duration**

10 days

**Course Objectives**

1. Master advanced PLC programming techniques for industrial automation systems
2. Develop expertise in ladder logic, structured text, and function block programming
3. Integrate HMI and SCADA systems for real-time industrial monitoring
4. Implement industrial communication protocols (Modbus, Profibus, Profinet, Ethernet/IP)
5. Design and optimize automated manufacturing control systems
6. Apply PID control loops in process automation
7. Troubleshoot complex PLC-based production line failures
8. Implement IIoT-enabled smart factory solutions
9. Enhance system efficiency using predictive maintenance strategies
10. Develop scalable multi-controller automation architectures
11. Configure and program industrial sensors and actuators
12. Improve manufacturing productivity using lean automation principles
13. Integrate cyber-physical systems in smart manufacturing environments

**Target Audience**

1. Automation and Control Engineers
2. Electrical and Electronics Engineers
3. Maintenance Technicians in Manufacturing Plants
4. Industrial Instrumentation Engineers
5. Mechatronics Engineers and Students
6. Production and Process Engineers
7. SCADA/HMI Developers
8. Technical Supervisors in Industrial Automation

**Course Modules**

**Module 1: PLC Fundamentals and Architecture**

- PLC hardware components overview
- Input/output modules and wiring

- CPU and memory structure
- Scan cycle operation
- Industrial applications overview
- **Case Study:** Basic conveyor belt automation system setup

**Module 2: Ladder Logic Programming**

- Ladder diagram fundamentals
- Boolean logic operations
- Timers and counters
- Interlocking circuits
- Safety logic implementation
- **Case Study:** Bottle filling line control system

**Module 3: Structured Text Programming**

- Syntax and programming rules
- Conditional statements
- Loops and iterations
- Data handling techniques
- Complex logic design
- **Case Study:** Batch chemical processing control

**Module 4: Function Block Diagram (FBD)**

- Block-based programming concepts
- Reusable function blocks
- Analog signal processing
- Control system structuring
- Modular programming design
- **Case Study:** Temperature control system in ovens

**Module 5: PLC Networking & Communication**

- Industrial Ethernet basics
- Modbus communication setup
- Profinet configuration
- Device addressing
- Network troubleshooting
- **Case Study:** Multi-machine factory synchronization

**Module 6: HMI Design and Integration**

- HMI screen development
- Real-time data visualization
- Alarm and event management
- User interface design
- PLC-HMI communication
- **Case Study:** Packaging plant monitoring dashboard

**Module 7: SCADA Systems**

- SCADA architecture overview
- Data acquisition methods
- Control room integration
- Historical data logging
- Remote monitoring systems
- **Case Study:** Power distribution monitoring system

**Module 8: Sensors and Actuators**

- Types of industrial sensors
- Signal conditioning techniques
- Actuator control principles
- Calibration methods
- Fault detection in sensors
- **Case Study:** Automated assembly line quality check

**Module 9: PID Control Systems**

- PID theory and tuning
- Real-time process control
- Stability analysis
- Feedback loop design
- Industrial tuning methods
- **Case Study:** Furnace temperature regulation system

**Module 10: Motion Control Systems**

- Servo motor control basics
- Stepper motor applications
- Positioning systems
- Speed and torque control
- Synchronization techniques
- **Case Study:** CNC machine axis control system

**Module 11: Industrial Troubleshooting**

- Fault detection techniques
- Diagnostic tools usage
- Error code interpretation
- System recovery methods
- Preventive maintenance strategies
- **Case Study:** Conveyor system breakdown analysis

**Module 12: Safety Systems in PLC**

- Emergency stop circuits
- Safety relays and interlocks
- Risk assessment methods
- Fail-safe programming
- Compliance standards
- **Case Study:** Robotic arm safety shutdown system

**Module 13: IIoT and Smart Manufacturing**

- IoT sensors integration
- Cloud data connectivity
- Edge computing basics
- Smart factory concepts
- Data analytics in manufacturing
- **Case Study:** Real-time production efficiency tracking

**Module 14: Advanced Automation Design**

- System architecture planning
- Redundancy design
- Scalability strategies
- Energy efficiency optimization
- Multi-PLC coordination
- **Case Study:** Automotive assembly plant automation

**Module 15: Capstone Industrial Project**

- End-to-end system design
- PLC + SCADA integration
- Real industrial simulation
- Fault handling implementation
- Performance optimization
- **Case Study:** Fully automated smart manufacturing line

## Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

**Register as a group from 3 participants for a Discount**

**Send us an email: info@fineskilltrainingcenter.org or call** *+254769199797*

***Certification***

*Upon successful completion of this training, participants will be issued with a globally- recognized certificate.*

***Tailor-Made Course***

*We also offer tailor-made courses based on your needs.*

**Key Notes**

**a.** The participant must be conversant with English.

**b.** Upon completion of training the participant will be issued with an Authorized Training Certificate

**c.** Course duration is flexible and the contents can be modified to fit any number of days.

**d.** The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

**e.** One-year post-training support Consultation and Coaching provided after the course.

**f.** Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

## Upcoming Scheduled Sessions

| Start Date | End Date | Location | Price |
|---|---|---|---|
| **23 Nov 2026** | 04 Dec 2026 | Online | $2,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $3,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $6,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $6,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $12,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $9,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $12,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $12,000 |

Ready to enroll or request a customized program? Book online or contact us:

**Register Online Now**

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com