Industrial Control Systems Engineering in Manufacturing Training Course

Professional Development Training Course Outline

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

Course Introduction

Industrial Control Systems (ICS) Engineering in Manufacturing is a critical discipline that integrates automation technology, industrial networking, SCADA systems, PLC programming, and smart factory integration to optimize production efficiency, safety, and reliability. As modern manufacturing shifts toward Industry 4.0, IIoT (Industrial Internet of Things), and digital transformation, ICS professionals play a vital role in ensuring seamless control of machines, processes, and real-time data flow across production environments.

This training course provides a comprehensive foundation in industrial automation systems, control engineering, cybersecurity for ICS, PLC/DCS architecture, and manufacturing process optimization. Industrial Control Systems Engineering in Manufacturing Training Course is designed to equip learners with hands-on skills in designing, operating, and maintaining advanced control systems used in smart manufacturing plants, oil & gas facilities, automotive production lines, and process industries, aligning with global standards of operational excellence and digital manufacturing innovation.

Programme Curriculum

Industrial Control Systems Engineering in Manufacturing Training Course

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Course Duration

10 days

Course Objectives

1. Master fundamentals of Industrial Control Systems (ICS) architecture
2. Understand PLC programming and ladder logic design
3. Apply SCADA system configuration and monitoring techniques
4. Develop skills in DCS (Distributed Control Systems) operations
5. Implement industrial communication protocols (Modbus, Profibus, OPC UA)
6. Strengthen knowledge of industrial cybersecurity and risk mitigation
7. Optimize manufacturing process automation workflows
8. Integrate IIoT (Industrial Internet of Things) in production systems
9. Analyze and troubleshoot control system faults and failures
10. Design HMI (Human Machine Interface) dashboards for operators
11. Enhance real-time data acquisition and control strategies
12. Ensure compliance with industrial safety and quality standards
13. Apply predictive maintenance using smart sensor data analytics

Target Audience

- Automation Engineers
- Electrical Engineers
- Manufacturing Plant Technicians
- Industrial Maintenance Engineers
- Control Systems Designers
- Mechatronics Engineers
- Process Engineers in Manufacturing
- Technical Project Managers in Industrial Automation

Course Modules

Module 1: Introduction to Industrial Control Systems

- ICS architecture overview
- Types of control systems (open vs closed loop)
- Manufacturing automation evolution
- Key components of ICS
- Case Study: Automotive assembly automation system design

Module 2: PLC Fundamentals

- PLC structure and operation
- Input/output modules

- Scan cycle explanation
- PLC hardware selection
- Case Study: PLC-based conveyor control system

Module 3: Ladder Logic Programming

- Basic ladder instructions
- Timers and counters
- Logic sequencing
- Debugging PLC programs
- Case Study: Bottling plant automation logic

Module 4: SCADA Systems

- SCADA architecture
- Data acquisition methods
- Real-time monitoring
- Alarm management
- Case Study: Power distribution SCADA system

Module 5: Distributed Control Systems (DCS)

- DCS architecture
- Process control integration
- Redundancy systems
- Operator interface design
- Case Study: Oil refinery process control

Module 6: Industrial Networking

- Ethernet/IP, Modbus, Profibus
- Network topology in factories
- Communication protocols
- Data transmission security
- Case Study: Smart factory networking layout

Module 7: Industrial Sensors and Actuators

- Sensor types and applications
- Signal conditioning
- Actuator control systems
- Calibration methods
- Case Study: Robotic arm sensor integration

Module 8: HMI Design and Implementation

- Interface design principles
- User experience in control systems
- Alarm visualization
- Touchscreen configuration
- Case Study: Packaging machine HMI system

Module 9: Industrial Cybersecurity

- ICS security threats
- Firewall and segmentation
- Secure remote access
- Risk assessment strategies
- Case Study: Cyberattack prevention in manufacturing plant

Module 10: IIoT in Manufacturing

- IoT sensors integration
- Cloud connectivity
- Edge computing
- Data analytics in production
- Case Study: Smart predictive maintenance system

Module 11: Process Automation Systems

- Continuous vs batch processes
- Automation flow design
- Control loop tuning
- Efficiency optimization
- Case Study: Chemical processing automation

Module 12: Troubleshooting and Diagnostics

- Fault detection methods
- Root cause analysis
- Maintenance strategies
- System recovery procedures
- Case Study: Downtime reduction in FMCG plant

Module 13: Safety Instrumented Systems (SIS)

- Safety lifecycle concepts
- Risk mitigation layers
- Emergency shutdown systems
- Compliance standards
- Case Study: Gas plant safety system

Module 14: Predictive Maintenance Systems

- Condition monitoring tools
- Vibration and thermal analysis
- AI-based prediction models
- Maintenance scheduling
- Case Study: Smart turbine monitoring system

Module 15: Smart Factory Integration

- Industry 4.0 frameworks
- Digital twin technology

- ERP integration
- Real-time optimization
- Case Study: Fully automated smart manufacturing plant

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

Start Date	End Date	Location	Price
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:

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