COURSE TABLE OF CONTENTS

Plant Logic Software Fundamentals

OEM: Koenig Original • Duration: 8 Days (60 hrs)

COURSE MODULES & TOPICS

Module 1: Industrial Automation and PLC Fundamentals

- Introduction to industrial automation
- Overview of plant automation systems
- PLC basics and evolution
- PLC vs relay-based control
- PLC architecture and components
- PLC operating cycle and scan time
- PLC applications in industry

Module 2: PLC Hardware and System Configuration

- PLC hardware components and specifications
- Types of PLCs: compact and modular
- Digital and analog I/O modules
- Sensors, actuators, and switches
- Motors, relays, contactors, solenoid valves
- PLC wiring and electrical connections
- PLC panel layout and configuration
- Practical: hardware identification and wiring

Module 3: PLC Programming Basics

- PLC programming fundamentals
- IEC 61131-3 programming standards
- PLC programming languages overview
- PLC programming software introduction
- Project creation and hardware configuration
- I/O mapping, tags, variables, addresses
- Downloading and uploading PLC programs
- Practical: basic PLC program

Module 4: Ladder Logic Programming Fundamentals

- Introduction to ladder logic
- Ladder diagram structure
- Contacts, coils, and internal relays
- Series and parallel logic operations
- Boolean logic: AND, OR, NOT
- Latching and unlatching logic
- Set/reset and timer instructions
- Practical: motor start/stop and interlocking

Module 5: Advanced PLC Programming Instructions

- Counter instructions: up, down, up/down

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- Comparison and arithmetic operations
- Data handling instructions
- Move, copy, and conversion
- Shift registers and bit manipulation
- Analog signal processing
- Scaling and normalization
- Practical: conveyor counting and sorting logic

Module 6: Plant Process Logic and Control Applications

- Plant process operations overview
- Process control systems introduction
- Discrete and continuous control
- PLC-based motor, pump, compressor control
- Conveyor and material handling automation
- Tank level and flow control
- Temperature and pressure monitoring
- Sequence control and interlocking
- Practical: plant equipment control logic

Module 7: HMI, SCADA, and PLC Integration

- Introduction to HMI
- HMI architecture and components
- SCADA systems overview
- PLC and HMI communication
- Creating HMI screens and graphics
- Tag configuration and data mapping
- Alarm and event management
- Trend displays and process monitoring
- PLC-SCADA communication protocols
- Practical: PLC and HMI integration

Module 8: Industrial Communication and Plant Network Integration

- Industrial communication fundamentals
- PLC communication architecture
- Serial and Ethernet communication
- Modbus communication configuration
- Industrial Ethernet networks
- PLC-to-PLC communication
- Remote I/O and distributed control
- Remote monitoring and OPC UA introduction
- Practical: PLC communication and data exchange

Module 9: PLC Troubleshooting, Testing, and Maintenance

- PLC diagnostics and fault identification
- Monitoring PLC programs online
- Input/output status monitoring
- Troubleshooting ladder logic programs
- Hardware and wiring fault diagnosis
- Communication error identification

- PLC backup and program recovery
- Preventive and predictive maintenance
- System testing and validation
- Practical: troubleshooting automation scenarios

Module 10: Industrial Automation Project and Implementation

- Understanding automation requirements
- Developing control specifications
- PLC hardware selection and I/O planning
- Designing PLC control logic
- Implementing interlocks and safety logic
- Developing sequence-based automation
- Integrating PLC with HMI/SCADA
- Simulation and functional testing
- System commissioning fundamentals
- Final hands-on project: conveyor, motor, sensors, alarms, HMI