

Fundamentals of Production Automation



Level 1

This certification provides foundational knowledge and hands on skills in production automation, preparing learners to safely assemble, commission, and maintain electromechanical production systems. Emphasizing Industry 4.0 principles, basic electrical and mechanical systems, motor control, PLCs, sensors and actuators, fluid power, and systematic troubleshooting, the program combines instructor led theory with paired lab work and simulation tools to develop practical competencies for industrial automation environments.

Industry Recognized Certification Topics

- Industry 4.0 concepts and network integration
- Industrial and wiring safety; lockout/tagout and safe work practices
- Print reading, BOMs, and dimensional metrology
- Tools, fasteners, and mechanical assembly techniques
- CNC basics (G/M codes, tool management)
- Mechanical drives, motors (DC/AC), and flexible drive concepts
- Motor control and frequency inverter basics
- Fluid power basics (hydraulics & pneumatics) and assembly
- Electrical systems, hard wired control, and control cabinet wiring
- Electrical distribution networks: panels, busbars, breakers, and fuses
- Circuit protection devices and selection basics (fuses, circuit breakers)
- Basic electrical wiring practices and grounding/earthing considerations
- Common AC components: capacitors, inductors, transformers, contactors, relays, switches
- AC waveforms, sinusoidal behavior, and basic reactance/impedance concepts
- Electrical measurement equipment and measurement best practices
- Sensors, actuators, and I/O integration
- Conveyor and material handling system commissioning, distribution/sorting station setup
- Commissioning, systematic troubleshooting, and diagnostics for electromechanical systems
- Preventive and corrective maintenance practices, cycle time analysis
- Lean production, 5S, value stream mapping, and OPEX basics
- Plan Do Check Act problem solving and quality tools
- Technical documentation, lab procedures, and required accessories/tools
- Digital learning and simulation support

Industry Recognized Certification Competencies

- Explain Industry 4.0 concepts and integrate basic networked I/O elements
- Apply industrial and electrical safety procedures, including lockout/tagout and wiring safety
- Read, interpret, and produce technical drawings, BOMs, and dimensional measurement records
- Perform semi precision and precision dimensional measurements and use metrology tools
- Select and use appropriate tools and fasteners for mechanical assembly and maintenance
- Describe basic CNC operation and programming concepts
- Assemble, align, and troubleshoot mechanical drives, conveyors, and drive components
- Replace, wire, commission, and troubleshoot DC and AC motors, including basic inverter/frequency drive concepts
- Implement hard wired control logic and wire control enclosures per provided wiring diagrams
- Size, wire, and explain basic electrical distribution and panel components (busbars, breakers, fuses) at a lab training level
- Select and apply appropriate circuit protection devices for basic control panels
- Apply basic grounding and earthing practices in panel and machine wiring
- Identify and explain the function of common AC components (capacitors, inductors, transformers, contactors, relays) and perform basic tests to validate operation
- Measure voltage, current, resistance, and basic AC parameters using multimeters, clamp meters, and appropriate measurement devices
- Calculate and interpret reactance/impedance for simple circuits and apply Ohm's law and power calculations in practical troubleshooting
- Mount, align, and validate sensor types and integrate sensors/actuators with PLC I/O
- Program, commission, and troubleshoot PLC sequences for conveyor, distribution, and sorting applications; perform I/O diagnostics and signal validation
- Conduct systematic commissioning, diagnostic testing, and fault isolation on electromechanical assemblies, including contactors and relays
- Perform preventive maintenance, basic repairs, and wear item replacement; apply cycle time analysis to optimize production flows
- Apply lean methods (5S, value stream mapping) and PDCA problem solving to laboratory and production setups
- Use simulation and eLearning tools to design, simulate, and validate circuits and control logic before hardware implementation
- Follow assembly and wiring documentation for torque specs, wiring diagrams, part lists, and safety instructions

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Units - 11

- Unit 1 – Industry 4.0
- Unit 2 – Industrial & Wiring Safety
- Unit 3 – Print Reading, BOMs & Measurements
- Unit 4 – Tools, Fasteners & Mechanical Assembly
- Unit 5 – CNC Overview
- Unit 6 – Mechanical Drives, Motors & Assembly
- Unit 7 – Fluid Power Concepts & Assembly
- Unit 8 – Electrical, Motor Control, PLC & Robotics
- Unit 9 – Control Cabinet Wiring & Hard Wired Control
- Unit 10 – Maintenance, Commissioning & Troubleshooting
- Unit 11 – Lean Production & Problem Solving

Labs - 11

- Lab 01 – Print Reading & Dimensional Measurements
- Lab 02 – Mechanical Assembly of Conveyor and Drive Modules
- Lab 03 – Connection Box & Control Cabinet Assembly
- Lab 04 – Electrical Wiring & Motor Connections
- Lab 05 – Distribution & Sorting Station Installation and Commissioning
- Lab 06 – PLC I/O Wiring, Sensor & Actuator Integration
- Lab 07 – Commissioning & Troubleshooting
- Lab 08 – Production Cycle Time Analysis
- Lab 09 – Motor Control & Frequency Inverter Basics
- Lab 10 – Production Cycle Time with Pneumatic Distribution
- Lab 11 – Conveyor Commissioning & System Integration

