



Integrated Professional Development Program in Electrical and Instrumentation



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Introduction:

The Integrated Professional Development Program in Electrical and Instrumentation equips professionals with practical and technical expertise essential for modern industrial operations. It addresses the integration of electrical systems and instrumentation technologies in the context of major infrastructure and energy sector projects.

This Electrical and Instrumentation Professional Development training course focuses on practical case studies, including MCC installation, SCADA systems revamp, and instrumentation in fluid storage and fire safety systems. The curriculum blends hands-on knowledge with system design, automation, and maintenance strategies.

Participants will gain insights into project execution, system upgrades, and integration of instrumentation with digital SCADA solutions. The Electrical and Instrumentation Professional Development course is for engineers and technicians operating in complex electrical and instrumentation environments. Learners will efficiently execute, monitor, and troubleshoot integrated systems.

Targeted Groups:

This Integrated Professional Development Program in Electrical and Instrumentation targets professionals seeking specialized knowledge and skills:

- Electrical engineers work in industrial installations.
- Instrumentation engineers and technicians.
- SCADA system integrators and maintenance specialists.
- Process control engineers and automation personnel.
- Site supervisors involved in the energy or oil & gas sectors.
- Maintenance teams oversee MCC and control systems.
- Supervisors are responsible for managing the flow station SCADA infrastructure.
- Operators of BBL storage units with SCADA instrumentation.
- Fire safety instrumentation technicians.
- Professionals upgrading legacy systems in plant operations.

Course Objectives:

Participants will achieve the following objectives by completing the Integrated Professional Development Program in Electrical and Instrumentation:

- Understand MCC installation components and workflow.
- Analyze electrical-instrumentation integration across industrial projects.
- Interpret SCADA system architecture for GDM Gas Lift applications.
- Assess pending SCADA infrastructure and project management gaps.
- Evaluate and implement SCADA in BBL tank installations.
- Identify fire pump systems and related instrumentation challenges.
- Diagnose and troubleshoot control systems for electrical safety.
- Optimize instrumentation loops and signal transmissions.
- Apply real-time monitoring and control principles.
- Demonstrate upgraded design thinking for flow station automation.
- Inspect and ensure SCADA system reliability and redundancy.
- Develop technical reports and system documentation revamp projects.
- Implement and execute maintenance strategies to ensure sustainable system performance.
- Coordinate with multi-disciplinary teams during installations.
- Practice system validation and calibration techniques.
- Implement safety protocols during electrical-instrumentation work.

Targeted Competencies:

Participants will gain the following competencies during the Electrical and Instrumentation Professional Development program:

- Proficiency in MCC installation standards and methodologies.
- Familiarity with SCADA integration for gas lift operations.
- Skills to oversee instrumentation projects in flow stations.
- Ability to manage system upgrades and commissioning.
- Competence in troubleshooting SCADA signal pathways.
- Understanding of fire pump system instrumentation.
- Application of predictive maintenance tools and logic.
- Documentation and planning for instrumentation revamp.
- Real-time data monitoring and system analysis skills.

Course Content:

Unit 1: MCC Installation and Configuration:

- Define Motor Control Centers MCC and their applications.
- Explore design standards and MCC classification.
- Plan the installation layout and power supply distribution.
- Analyze starter types: DOL, star-delta, and soft starters.
- Apply safety interlocks and circuit protections.
- Install and test MCCs in industrial setups.
- Inspect wiring, grounding, and panel safety.
- Troubleshoot MCC faults and failures.
- Maintain MCC systems for operational readiness.

Unit 2: SCADA Systems for GDM Gas Lift:

- Overview of SCADA and gas lift integration.
- Identify key modules in the GDM system architecture.
- Map sensor input and actuator output channels.
- Calibrate instruments for pressure and flow monitoring.
- Install Human-Machine Interfaces HMIs for field control.
- Implement PLC-SCADA communication protocols.
- Review successful revamp procedures.
- Examine data logging and trend analysis.
- Assess the efficiency of the completed upgrade.

Unit 3: Unawarded Flow Station SCADA Projects:

- Outline project scoping for SCADA revamps.
- Recognize factors delaying SCADA implementation.
- Evaluate risks from non-automated operations.
- Draft flow station control architecture.
- Understand procurement and contractor selection processes.
- Prepare readiness reports for future implementation.
- Recommend strategies for proposal evaluation.
- Compare automation standards across stations.
- Emphasize value engineering in control design.

Unit 4: SCADA Installation for 4x40,000 BBL Tanks:

- Analyze tank farm layout and instrumentation points.
- Implement SCADA for volume, pressure, and temperature.
- Integrate radar-level transmitters with control units.
- Select redundant communication protocols for tanks.
- Interface storage with central SCADA dashboards.
- Monitor real-time data and generate reports.
- Review the commissioning checklist for BBL SCADA.
- Ensure the calibration accuracy of tank sensors.
- Maintain the system's uptime and cybersecurity.

Unit 5: Fire Joke Pump and Instrumentation Systems:

- Define fire pump operation standards in process plants.
- Map sensor and actuator logic in fire protection systems.
- Connect fire pump controllers to SCADA/HMI systems.
- Analyze ongoing revamp requirements and improvements.
- Implement alarm and fault detection protocols.
- Maintain the accuracy of the pressure switch and flow detector.
- Calibrate fire protection loops.
- Document safety performance metrics.
- Coordinate emergency test runs.

Unit 6: Electrical and Instrumentation Revamp Projects:

- Explore system revamp lifecycle planning.
- Audit existing electrical and instrumentation infrastructure.
- Prepare BOQs and technical specifications.
- Align project deliverables with control standards.
- Review HAZOP and risk assessment for revamps.
- Apply upgrade methodologies without a full shutdown.
- Validate installations post-revamp.
- Manage stakeholder expectations and change requests.
- Finalize performance testing and handover.

Unit 7: Instrumentation Calibration and Signal Loop Testing:

- Identify the types of sensors used in process instrumentation.
- Conduct analog and digital loop checks.
- Use handheld calibrators and HART communicators.
- Trace signal paths and isolate faults.
- Establish calibration records and tag management.
- Verify signal scaling and ranges.
- Apply 4- 20mA testing and configuration.
- Ensure compliance with ISO/IEC standards.
- Calibrate safety instruments and emergency cut-offs.

Unit 8: Real-Time Monitoring and Data Acquisition:

- Design data acquisition systems in SCADA.
- Monitor parameters through real-time dashboards.
- Integrate alarms and status indicators.
- Develop trends and historical logs.
- Set up reporting for process optimization.
- Analyze anomalies and downtime causes.
- Sync SCADA with ERP and DCS systems.
- Maintain tag databases and naming conventions.
- Evaluate bandwidth for SCADA traffic.

Unit 9: Troubleshooting and Maintenance Strategies:

- Categorize electrical and instrumentation faults.
- Use diagnostics tools for system analysis.
- Plan preventive and predictive maintenance schedules.
- Apply failure mode and root cause analysis.
- Perform functional testing under load.
- Maintain documentation of issues and resolutions.
- Coordinate multi-disciplinary troubleshooting efforts.
- Train staff on basic fault recovery.
- Optimize maintenance costs through data-driven strategies.

Unit 10: Project Management and Technical Documentation:

- Manage integrated E&I project timelines.
- Document installation and commissioning procedures.
- Develop test procedures and checklists.
- Track procurement and delivery milestones.
- Control change management across the project scope.
- Maintain communication logs with contractors.
- Compile as-built drawings and redlines.
- Submit technical reports and project closeout.
- Conduct post-implementation review sessions.

Final Insights & Key Takeaways:

This Electrical and Instrumentation Professional Development course equips professionals with the essential expertise needed to design, execute, and manage complex electrical and instrumentation systems. It integrates real-world projects with best practices to enhance automation, safety, and reliability. Participants will walk away ready to lead SCADA installations, revamps, and instrumentation upgrades. Strong technical and project documentation skills will also be reinforced throughout the process.