€ TRAINING

ISA Training for Instruments Maintenance and Control

2 - 13 June 2024
Istanbul (Turkey)
Sheraton Istanbul Levent

ISA Training for Instruments Maintenance and Control

REF: O1377 DATE: 2 - 13 June 2024 Venue: Istanbul (Turkey) - Sheraton Istanbul Levent Fee: 9560 Euro

Introduction:

This class focuses on the knowledge and skill-sets required to function as an instrument maintenance technician. The electrical skill-sets possessed by a trained electrician will serve as a basis for expansion to include the skill-set required to maintain an instrument control system. Process measurement techniques, measurement, and control equipment, calibrations techniques, and calibration equipment will be discussed and utilized in numerous hands-on lab sessions. The knowledge and skill-sets gained from attending this class will lead the student to become an asset to an I&E maintenance team.

Course Objectives:

At the end of this course, the participants will be able to:

- Introduce students to instrument documentation for proper document interpretation
- Review physics terminology and definitions, math functions, and engineering unit assignments as used in the instrumentation field
- Introduce instrument calibration equipment and its proper utilization
- Discuss process control and measurement fundamentals and related equipment
- Discuss analog/digital transmission signals
- Relay proper use of HART communicators
- Discuss process control valve elements, makeup, and function
- Provide proper calibration techniques for transmitters and control valves
- Practice loop wiring connections, calibrations, equipment configurations/operations
- Discuss instrument troubleshooting techniques
- Discuss process control fundamentals

Targeted Audience:

- Electricians assigned the additional responsibilities of instrument maintenance
- Technicians with electrical skills cross-training into the instrument discipline
- Supervisors needing to audit/ evaluate a cross-training program for their employees

Course Outlines:

Unit 1: Fundamental Principles:

- Electronic Field Instrumentation
- Why Maintain?
- Maintenance vs. Troubleshooting
- Calibration and Reasons to Calibrate
- Troubleshooting
- Basic Troubleshooting Techniques
- Designed with Maintenance in Mind

Unit 2: Diagrams, Symbols, and Specifications:

- Process Piping & Instrumentation Diagram
- Instrument Loop Diagrams
- Logic Diagrams
- Highway Drawings
- Specifications
- Instrument Symbols

Unit 3: Maintenance Personnel:

- Multi-Disciplined
- Continuous Training
- Training of Maintenance Workers
- Multicraft/Multiskilled, Multi-Disciplined
- Knowledge Factors
- Skills
- Job Titles and Descriptions
- Credentialing
- Certification
- Table of Contents

Unit 4: Maintenance Management and Engineering:

- The Need for Maintenance Management
- Maintenance Philosophy
- Maintenance Management Organization
- Basic Requirements for a Maintenance Department
- Planning and Scheduling
- Work Order System
- MTTF, MTTR, and Availability
- Training Maintenance Workers
- Preparing Functional Specifications
- Computerized Maintenance Management Systems
- Office/Shop Layout
- Centralized/Decentralized Shops

Unit 5: Pressure and Flow Instruments:

- Pressure Transmitters
- Differential Pressure Technology
- Level Transmitters
- Flow Transmitters
- Magnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Open Channel Flowmeters
- Vortex Shedding Flowmeter
- Vortex Shedding Meters
- Positive Displacement Flowmeters
- Positive Displacement Meters
- Target Flowmeters
- Thermal Mass Flowmeters
- Ultrasonic Flowmeters

- Variable Area Flowmeters
- Insertion Sampling Flowmeters

Unit 6: Maintenance Engineering:

- Engineering Assistance
- Maintenance Involvement in New Projects
- Successful Maintenance
- The High Maintenance System
- Documentation Control
- Alternative Methods of Maintenance
- Service/Contract Maintenance
- In-House Maintenance versus Contract Maintenance
- New Systems Installations and Checkout
- Preventive Maintenance
- Power, Grounding, and Isolation Requirements
- Instrument Air Requirements
- Communication Requirements
- Heating, Ventilating, Cooling, and Air Conditioning Systems

Unit 7: Temperature Devices:

- Thermocouples
- Resistance Temperature Devices
- Thermistors
- Integrated Circuit Temperature Transducer
- Infrared Temperature Transducers
- Optical Fiber Thermometry
- Thermometers

Unit 8: Panel and Transmitting Instruments:

- Panel and Behind-Panel Instruments
- Panel Meters
- Discrete Switches
- Potentiometers
- Recorders
- Transducers
- Smart Transmitters

Unit 9: Analytical Instruments:

- Field Analytical Instrument Systems
- Field Analytical Instruments
- Organization
- Personnel
- Maintenance Approaches
- Service Factor
- Maintenance Work Load
- Spare Parts
- Vendor Support

- Application Unique Issues
- Installation Issues

Unit 8: Primary Elements and Final Control Devices:

- Temperature
- Primary Elements
- Primary Element Location
- Control Valves
- Troubleshooting Guide

Unit 9: Pneumatic Instruments:

- Instrument Air Requirements
- Pneumatic Field Instruments

Unit 10: Calibration:

- Field Calibration
- Calibrating in Hazardous Locations
- In-Shop Calibration
- Other Aspects of Calibration

Unit 11: Tuning:

- Loop Classification by Control Function
- Control Algorithms
- Loop Tuning
- Flow Loops

Unit 12: Distributed Control Systems:

- Distributed Control System Maintenance
- Maintenance Goals and Objectives
- Programmable Logic Controllers

Unit 13: Software and Network Maintenance:

- Computer Operating Environment
- 21st Century Maintenance Technology

Unit 14: Safety:

- Electrical Hazards
- Hazardous Areas
- Contamination
- Pressures and Vacuums
- High Voltage
- Moving and Rotating Machinery
- High and Low Temperatures
- Gases and Chemicals

- Heights and Confined Spaces
- Program Changes, Software Control
- Process Considerations
- Communication
- Cryogenic Considerations
- Nuclear Plants
- Ergonomics
- Acknowledgment
- Standards and Recommended Practices

Unit 15: Fiber Optics:

- Construction
- Classification
- Sensing Modes
- Advantages
- Disadvantages
- Applications
- Analog Input/Output Modules
- Sensors