Training Title

Analyze Control System Functions, Coordinate Remedial Actions

Training Duration

5 days

Training Dates & Venue

REF IC072	Analyze Control System Functions, Coordinate Remedial Actions	5	22-26 March, 2021	$6,500	Amsterdam, Netherlands

Will be conducted in a five star hotel to be finalized upon confirmation.

Training Fees

- **6,500 US$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch**

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING OBJECTIVES

- **This course is aimed to provide engineers, technicians and supervisors with the basic theoretical and practical understanding of:**
- **Implement an instrument and wiring number system**
- **Pressure sources and the basic terms of pressure measurement**
- **Level measurement and the basics associated with it**
- **Temperature measurement and the various associated transducers**
- **Flow measurement techniques**
- **Control valve principles and common valve types**
- **New technologies such as smart instrumentation and fieldbus**
- **Integrate a complete system (considering instrumentation and total errors) as well as selection criteria, commissioning and testing**
- **Overview of the use of PLCs in industrial applications**
- **Overview of HMI, SCADA and DCS systems**
- **Specify PLC hardware and installation criteria**
- **Describe PLC software structure, Ladder Logic, Function Block System (FBS),**
- **Instruction List (IL) as per IEC 1131.**
- **Write medium level PLC programs**
- **Troubleshoot a typical PLC system**
- **Specify DCS hardware components**

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- Understand the DCS functions and features
- Learn how DCS configured
- Understand the fundamental of SCADA systems
- Gain knowledge of the key industrial communication networks and protocols
- Learn how to effectively apply SCADA System security

WHO SHOULD ATTEND

This course focuses on analyzing, functions, calibration and troubleshooting of different systems for Engineers and Technicians.

- Control and instrumentation
- Control system
- Electrical installations
- Field technical support
- Maintenance
- Instrumentation Maintenance Technicians
- Electrical Engineers and Technicians
- Plant Operations Engineers, Supervisors and Operators
- Maintenance Supervisors

TRAINING METHOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course. Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work& Practical Exercises
- 20% Videos & General Discussions

TRAINING OUTLINE

Chapter 1
Introduction to Instrumentation & Control System

This gives an overview of measurement terms and concepts. A review is given of process and instrumentation diagram symbols and places instrumentation and valves in the context of a complete control system.

Chapter 2
Flow Measurement

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Initially the basic principles of flow measurement are discussed and then each technique is examined. This ranges from differential pressure flowmeters to mass flow meters. Theinstallation aspects are also reviewed.

Chapter 3
Level Measurement

The principles of level measurement are reviewed and the various techniques examined ranging from simple sight glasses to density measurement. Installation considerations are again discussed

Chapter 4
Temperature Measurement

The principles of temperature measurement are discussed and the various transducers examined ranging from thermocouples to non-contact pyrometers. Installation and impact on the overall loop are also briefly discussed.

Chapter 5
Pressure Measurement

This section commences with a review of the basic terms of pressure measurement and moves onto pressure sources. The various pressure transducers and elements are discussed with reference to installation considerations.

Chapter 6
Control Valves

The principles of control valves are initially reviewed. Various types of valves ranging from sliding stem valves to rotary valves are also discussed. Control valve selection and sizing, characteristics and trim are also examined. The important issues of cavitation and noise are reviewed. Installation considerations are noted. In addition to safety Relief valves, types, valve components, operations and testing.

Chapter 7
Process control - Basic Control philosophy

This gives an overview and describes process control terms and definition, process dynamic characteristics in terms of time constant and transportation time lags, process gain and stability, control system classifications and actions. Functions of automatic control and its elements, feedback & feed forward control and cascade control.

Chapter 8
Fundamental of process control

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This explains the different control modes, on-off control, Proportional (p), Integral (I), Integral windup, Derivative (D) and PID CONTROL, PID Algorithms, Ideal, series and parallel algorithms, load disturbances, process control loops (single, multi-variables, cascade, feed-forward, batch and ratio control.

Chapter 9
Process control loop examples
Examples for single control loop, feedback loop, multivariable loop, feedforward, both manual and automatic, a combination of feedforwad plus feedback , Ratio control as well as cascade control loop were given

Chapter 10
Tuning PID Controller
objectives of tuning, methods of tuning, Reaction curve method (Ziegler–Nichols), The procedure to obtain an open loop reaction curve Recording the PV, open loop tuning method , Ziegler–Nichols PI control algorithm, Ziegler–Nichols PID control algorithm, Examples of Ziegler–Nichols P, I and D open loop control algorithms, Continuous cycling method (Ziegler–Nichols) and self tuning controller.

Note:
Pre & Post Tests will be conducted
Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.

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