Advanced Valve Technology: Design, Selection, Installation, Applications, Sizing, Inspection, Maintenance & Troubleshooting

Introduction:

Power plant and other petrochemical industries do deal with different types of valves. All piping systems are fitted with valves for controlling purposes or safety requirements. Understanding the function of each valve type will have an important reflection on the process quality, equipment and plant reliability, and the economics of the whole activity. Different application needs to select the appropriate valve type of a particular flow characteristic. Operation with the valve also affects the system and the process. Understanding the problems associated with valves is essential for diagnosis and troubleshooting and the needed maintenance of the particular type of valves.

Who Should Attend?

Engineers and technicians of mechanical, electrical and chemical engineering will benefit largely from this seminar. Maintenance, operation, and people R and D department are recommended to attend this course.

Course Objectives:

At the end of this seminar participants will have: * An understanding of different parameters affecting the operation of valves * The ability to select the right valve for the particular application * The ability to perform the necessary calculation for valve sizing * An understanding of the problems associated with valves like flashing, slamming and

water hammer * The ability to perform troubleshooting of systems involving valves * The ability to decide on the right maintenance plan concerning different types of valves

Course Outline:

Day 1

Basics of the Valve Technology

Valves Technology

Types of Valves

Valves Characteristics

- ✓ **Sealing Performance**

- Leakage Criterion
- Leakage Classifications
- Sealing Mechanisms
- Valve Stem Seals

- ✓ **Flow Characteristics**

- Flow Through Valves
- Valve Flow Characteristics
- Linear & Equal %

Day 2

Manual vs. Automatic Valves

Manual Valves

Functions of Manual Valves

Methods of Regulation

- ✓ **Valve Types:**

- Stopping / Starting Valves
- Control Valves

Valve and Connections

Valves Rating

Valves Seating

- ✓ **Types of Manual Valves**

- Gate Valves
- Plug Valves
- Ball Valves
- Butterfly Valves
- Pinch Valves
- Diaphragm Valves

Check Valves

Applications

- ✓ **Types of Check Valves**

- Lift Check Valves
- Swing Check Valves
- Tilting – disc Check Valves
- Diaphragm Check Valves

Check Valves Operation

Selection of Check Valves

Day 3

Relief and Safety Valves: Function and Operation

Relief and Safety Valves

- ✓ **Relief Valve Types**

- Pressure – relieving Devices
- Automatically operated Valves
- Direct – acting and Piloted Pressure Relief Valves
- Modulating, Full – Lift, and Ordinary Pressure Relief Valves

Valve Loading

Safety Valves

Operation of Rupture Discs

Day 4

Valves Troubleshooting

Valves Problem, and Troubleshooting

High Pressure Drop

- Pressure Recovery Characteristics

✓ Cavitation in Valves

- Incipient and Choked Cavitation
- Flow Curve Cavitation Index
- Cavitation – Elimination Devices

Flashing vs. Cavitation

Flow Choking

High Velocities

✓ Water Hammer

- What causes water hammer?
- Water Hammer Calculations

- Solutions of Water Hammer

Surge Protection

Check Valve Slamming

Noise Problems

Clean Air Standards

Life Loading

Packing for Fugitive-emission Control

Troubleshooting and Control Valves

Control Valves and Actuators

Control Valves Types

Linear Valve Features

Rotary Valve Features

- ✓ **Control Valve Flow Characteristics**

- Quick Opening Characteristics
- Linear & Equal %

Actuation Systems

✓ **Types of Actuators**

- Pneumatic piston Actuator
- Electric Motors
- Electrohydraulic Actuators

Actuator Performance

Valve Positioner

Operation of Positioners

- Positioner Calibration

Day 5

Valve Sizing and Selection

Valve-sizing Criteria for Manual Valves

Valve-sizing criteria for Check Valves

Valve-sizing Criteria for Throttling Valves

Incipient and Advanced Cavitation

Terminal Pressure Drop Ratio

Percent of Flashing

Pressure Recovery Coefficient

Valve Sizing & Selection Procedure

Selecting a Valve Type

Different Valves Characteristics

Examples