



## **PRACTICAL PUMP AND VALVE TECHNOLOGY**

### **5-Day Training Program**

#### **INTRODUCTION**

This course covers the parts and components of different types of valves; the methods of operation and maintenance; the troubleshooting and maintenance used in valves. This course will explain the main types of manual and control valves and their actuators; This course is designed to give trainees a solid, practical understanding of common process control equipment and of the actual concepts and factors involved in setting up, maintaining, tuning, and troubleshooting a variety of valves and their control systems.

This course is best suited to candidates who are familiar with basic information on valves; mechanical principles and basic electricity, and have a basic knowledge of instrumentation systems.

The course will finish by going back to the start by mentioning and giving examples of process integration, where control valves are employed to utilize fluid flow.

The course is a well structured one and a busy and very much evolved one, the candidate will get the most updated knowledge and they learn the modern techniques in profile solving and in computing appellation.

#### **OBJECTIVES**

- ✚ To be able to analyze the fundamental operation parameters and the control systems in all types of valves including the control valves.
- ✚ Valves operation and construction; inspection and maintenance

#### **WHAT YOU WILL GAIN**

- ✚ Understand the actual operation principles of valves that you work with, and learn about the limitations and possibilities of your equipment.
- ✚ Learn how to improve productivity, efficiency, safety, and product quality.



- ✚ Save time and money on your next renovation or upgrade - get honest, unbiased information on what is available in the process control field, and the typical advantages and disadvantages of common equipment.
- ✚ Learn how to choose and set-up the right control applications and control strategies for your plant processes.
- ✚ Learn to design, set-up, configure, and tune actual control loops in a safe environment. This training provides offers students the unique opportunity to learn and discuss any issue related to valves technology without having to worry about damaging equipment or facilities.

### **LEARNING OUTCOMES**

- ✚ **Gain** knowledge of the different types of valves including the ones on control valves used in oil & gas industry technologies to determine whether you are employing best practices in your system and protecting critical assets.
- ✚ **Understand** the importance of well designed and operated pre-treatment systems upstream of valves to increase overall plant reliability and lower operating costs.
- ✚ **Learn** to interpret industry-wide guidelines and monitor key performance indicators of all valves as well as the control valves and actuators.
- ✚ **Determine** the basic principles of all valves including control valves and their construction and operation
- ✚ **Strengthen** your skills to troubleshoot valves; and actuators
- ✚ **Obtain** invaluable insights on how to design for success in oil & gas industry.

### **WHO SHOULD ATTEND**

New graduated engineers; maintenance personnels; static equipment operators, control engineers; instrumentation personals

### **PROGRAM**

#### **DAY 1**

#### **Types of control valves and their characteristic & operations mechanism**

- ✚ Types
- ✚ Terms and definitions
- ✚ Parts and components

**Diaphragm** – gives some control and will handle corrosive slurries.

- ✚ Effects of control actuators
- ✚ Control valves (types, characteristics, Cv sizing)
- ✚ Valve actuators (types, fail modes, dead band)
- ✚ Variable speed motor controls (DC and AC)
- ✚ On / Off control action
- ✚ Common problems in process control systems
- ✚ Troubleshooting process control systems

**Gearboxes:** Used to ensure easier operation of larger valves.

**Diaphragm valve:** A bi-directional valve which is operated by applying an external force to a flexible element, or diaphragm (typically an elastomer).

## **DAY 2**

### **Operation of all valves**

- ✚ Application of all valves including the control valves
- ✚ Operation: procedure of all valves manual and automatic

**Pressure reducing valve** is always open with the amount depending upon the required downstream and actual upstream pressures.

Uses of control valves

**Relief valve** – as a safety valve to prevent excess pressure

- ✚ Pressure safety valves
- ✚ The difference between PSV' PRV and the operation principles

**Damaging Reducing valve** – to control the downstream pressure at a required value.

### **Location of critical valves**

- ✚ Actuators
- ✚ Codes and fabrication
- ✚ Pressure rating valves

**Actuators:** Device used to open or close or control valves.

**Air valves:** Valve that is used to control the flow rate of air.

**Back-pressure:** The pressure exerted on the downstream side of a valve

### Location of critical valves

- ✚ Actuators
- ✚ Codes and fabrication
- ✚ Pressure rating valves

**Actuators:** Device used to open or close or control valves.

**Air valves:** Valve that is used to control the flow rate of air.

**Back-pressure:** The pressure exerted on the downstream side of a valve

### DAY 3

Details the operations and components of all valves including but not restricted to the following list:

- ✚ Ball valves
- ✚ Bellows
- ✚ Butterfly
- ✚ Bypass valves
- ✚ Check valves
- ✚ Diverter valve
- ✚ Double block and bleed
- ✚ Electric actuators
- ✚ Extended bonnets
- ✚ Float valves
- ✚ Full bore
- ✚ Gate valves
- ✚ Globe valves
- ✚ Hydraulic actuators
- ✚ Jacketed valves
- ✚ Line blinds
- ✚ Multi-ported
- ✚ Multi-turn



- + Needle valves
- + Penstock valves

## **DAY 4**

### **Manual Valves & Control Valves Design**

#### **Valves & Pipe-work**

#### **Technical Information**

Manufactures standard as well as customized pipes, fittings, and spools according to customer's requirements. The standard product range has been designed to resolve most industrial valves problems.

#### **Selection of control valves type**

(Service Temperature; Fluid to be carried; Service Pressure; flow rate ..... etc.

- + The Control valves work in oil industry
- + The main uses for CV in oil industry are in transport of materials;
  - Plant services
  - Process materials

The control valve & pipe work joints (Welding, brazing, cementing, flanges, socket and spigot, unions and couplings [screwing], flared and compression joints

#### **Control Valves work fabrication**

To keep the cost low by using an expensive corrosion resistant lining to a cheap but strong valve made out of metal that would normally corrode rather than constructing the whole CV out of the expensive material.

#### **CV work lagging**

Lagging minimizes heat loss and protects operators from hot surfaces.

- + Coating regulations & protection
- + Isolation ; Types of fittings
- + Installation procedure

## Installation procedures

- ✚ Safety shear valves under dispensers
- ✚ Minimum pipe slope
- ✚ Testing the valves system
- ✚ Vent line requirements
- ✚ Hydrostatic & pneumatic testing
- ✚ Types of materials

## DAY 5

### Maintenance & Inspection

- ✚ Diagnostic testing
- ✚ Troubleshooting
- ✚ Maintenance and repairs
- ✚ Inspection - the Control valves & actuators
- ✚ Maintenance Inspection, Inspecting Out-of-Service for CV & actuators
- ✚ Record Keeping; Scheduling and Preparing for Cleaning, Repairs and Alterations
- ✚ Control Valves Cleaning
- ✚ Maintaining and Repairing Closures, Channels; stem; seals; seats; discs; and Bonnets;
- ✚ Actuator ; gear box Repairs and Alterations -
- ✚ Design of a simple control valve
- ✚ Overall control valves coefficient
- ✚ Single and multiphase flow in control valves
- ✚ Methods of calculation