Pump and Valve Technology: Selection, Operation and Maintenance

Energy Milestones Corporation

Advancing Professionals to the next level

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Pump and Valve Technology: Selection, Operation and Maintenance

Overview

This course will introduce delegates to the various types of pumps and valves, along with their associated terminology. Centrifugal and positive-displacement pumps, packing, mechanical seals and sealing systems, bearings and couplings will all be discussed. Valves for isolation and valves for control will be addressed. The application of various types of pumps and valves will be discussed, along with their suitability for different operational duties. Operation, troubleshooting and maintenance will be dealt with in depth.

Course Objectives

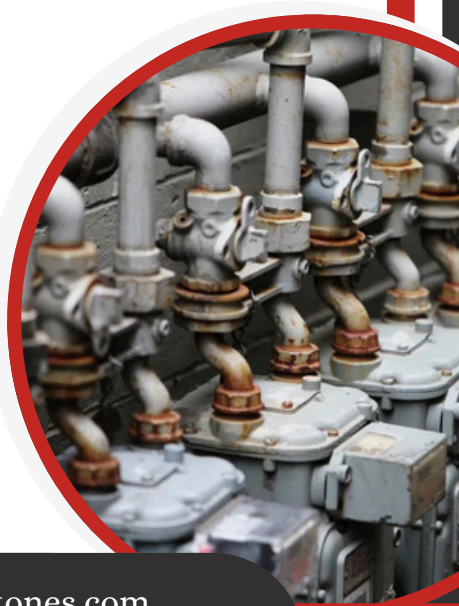
At the end of this course, the participants will be able to:

- Understand the different types of pumps and their associated terminology.
- Have an understanding of Centrifugal and positive displacement pumps, packing, mechanical seals, sealing systems, bearings and couplings.
- Know the different parameters affecting the operation of valves
- Select the correct valve for the particular application, and perform the necessary calculation for valve sizing
- Perform troubleshooting of systems involving valves
- Decide on the proper maintenance plan concerning different types of valves

Course Content

Pumping Systems

1. Introduction
   - Pump Types and Terminology
   - Pump Performance (Centrifugal and Positive Displacement)



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Course Content

2. Understanding Head
- Types of Head: Friction, Pressure, Static & Velocity
- Friction in Valves, Piping & Fittings
- Calculating Actual Head in a System

3. Cavitation in Pumps and Valves
- Net Positive Suction Head (NPSH)
- Vapour and Gas Cavitation
- Flashing vs. Cavitation

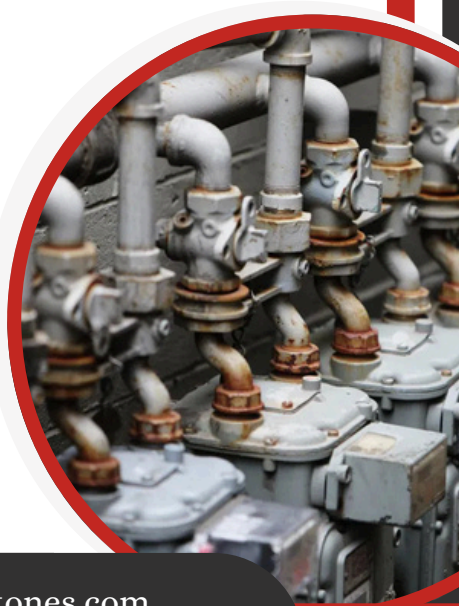
Pump Types

1. Positive Displacement Pumps
- Reciprocating Pumps
- Reciprocating Pump Valves
- Rotary Pumps – scroll and gear types
- Failure Mechanisms – identification and monitoring

2. Centrifugal Pumps
- Centrifugal Pump Theory
- Pump Components
- Matching Pumps with Drivers
- Performance Analysis
- Failure Mechanisms – identification and monitoring

Achieving Pump Reliability

1. Sealing Systems
- Conventional Packing Glands, Mechanical Seals & Flush Plans
- Seal Failure Mechanisms
- Maintenance and Repair of Mechanical Seals



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Course Content

2. Bearings – failure modes and how to extend life
   - Lubrication
   - Plain Bearings
   - Anti-Friction Bearings

3. Couplings & Alignment
   - Couplings
   - Alignment & Balancing
   - Foundations & Bedplates

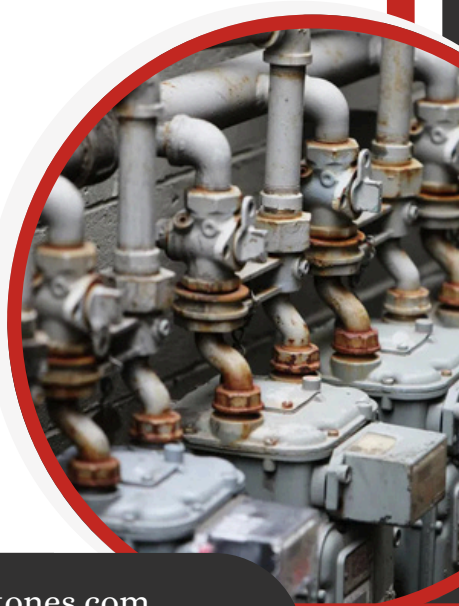
Valve Technology

1. Types of Valves (globe, gate, ball, plug, check)

2. Flow Characteristics
   - Flow through Valves
   - Valve Flow Characteristics
   - Linear, Quick Opening & Equal%

3. Valve Sizing
   - Calculating the Correct CV Value
   - Selecting Valve Size Using Valve Coefficient
   - Calculations for Correct Valve

4. Sealing Performance
   - Leakage Classifications
   - Sealing Mechanisms
   - Valve Stem Seals



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Course Content

Valves Troubleshooting & Maintenance

1. High Pressure Drop

- Pressure Recovery Characteristics
- Flow Choking
- High Velocities

2. Water Hammer

- What causes water hammer?
- Solutions for Water Hammer

3. Troubleshooting the Control & Isolation Valves

- Review of Common Faults
- Developing a Preventive Maintenance Plan

Targeted Audience

Engineers, technicians, and managers responsible for the selection, installation, analysis of machinery failure, troubleshooting, and maintenance of Pumps and Valves need to attend this course.

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be used before and during the course whenever applicable. These methods are aimed at enhancing individual and group interaction while maximizing learning. Some of these methods are:

- Online Pre-post Test
- Colorful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games