



## Practical Pump and Valve Technology Training

### Description

#### Introduction

The course will introduce delegates to the different types of pumps and valves and 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 the different 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.

#### The knowledge gained in this course will:

- Enable the delegate to optimise the operation and maintenance of different types of pumps
- Give the delegate confidence to carry out failure analyses on pumps thereby avoiding repetitive failures
- Allow tighter control of maintenance budgets by the avoidance of unplanned equipment failures in service

#### Objectives

#### At the end of this course participants will:

- Have an understanding of the different types of pumps and their associated terminology
- Have an understanding of Centrifugal and positive displacement pumps, packing, mechanical seals and sealing systems, bearings and couplings
- Have an understanding of different parameters affecting the operation of valves
- Have the ability to select the right valve for the particular application and to perform the necessary calculation for valve sizing
- Have the ability to perform troubleshooting of systems involving valves
- Have the ability to decide on the right maintenance plan concerning different types of valves

## The Contents

### Day 1 – Pumping Systems

- **Introduction**
  - Pump Types and Terminology
  - Pump Performance (Centrifugal and Positive Displacement)
- **Understanding Head**
  - Types of Head: Friction, Pressure, Static & Velocity
  - Friction in Valves, Piping & Fittings
  - Calculating Actual Head in a System
- **Cavitation in pumps and valves**
  - Net Positive Suction Head (NPSH)
  - Vapour and Gas Cavitation
  - Flashing versus Cavitation

### Day 2 – Pump Types

- **Positive Displacement Pumps**
  - Reciprocating Pumps
  - Reciprocating Pump Valves
  - Rotary Pumps – scroll and gear types
  - Failure Mechanisms – identification and monitoring
- **Centrifugal Pumps**
  - Centrifugal Pump Theory
  - Pump Components
  - Matching Pumps with Drivers
  - Performance Analysis
  - Failure Mechanisms – identification and monitoring

### Day 3 – Achieving Pump Reliability

- **Sealing Systems**
  - Conventional Packing Glands, Mechanical Seals & Flush Plans
  - Seal Failure Mechanisms
  - Maintenance and Repair of Mechanical Seals
- **Bearings – failure modes and how to extend life**
  - Lubrication
  - Plain Bearings
  - Anti-Friction Bearings
- **Couplings & Alignment**
  - Couplings
  - Alignment & Balancing
  - Foundations & Bedplates

### Day 4 – Valves Technology

- **Types of Valves (globe, gate, ball, plug, check)**
- **Flow characteristics**
  - Flow through valves
  - Valve flow characteristics
  - Linear, quick opening & equal %
- **Valve Sizing**
  - Calculating the correct Cv value
  - Selecting Valve Size Using Valve Coefficient
  - Calculations for Correct Valve Selection
- **Sealing performance**
  - Leakage Classifications
  - Sealing Mechanisms
  - Valve stem seals

## Day 5 – Valves Troubleshooting & Maintenance

- **High Pressure Drop**
    - Pressure Recovery Characteristics
    - Flow Choking
    - High Velocities
  - **Water Hammer**
    - What causes water hammer?
    - Solutions for water hammer
  - **Troubleshooting the Control & Isolation Valves**
    - Review of common faults
    - Developing a Preventive Maintenance Plan
  - **Review & Wrap-Up**
- www.acculearn.co.uk