Best Technology Soultions **(BTS)**

Training Program

Pumps & Pumping Systems In Petrochemical & Process Industry

Training Program

Introduction:

Pumps of various designs and applications, are encountered throughout petrochemical and process industries. Pumping systems sometimes have to provide efficient transport of complex and difficult fluids. This course will provide an overview of technical aspects of pumps and pumping systems as encountered in industrial applications. Of special interest will be centrifugal pumps as well as other types of positive displacement pumps

The pumps and pumping systems course will concentrate on thorough understanding of technical principles of fluid flow in pumping systems as a prerequisite for successful pump installation and operation. The focus will be on the potential problems in operation and will include pump inspection and condition monitoring. The course will also include various examples selected from real-life technical practice that will be solved and discussed in order to illustrate methods of efficient operation and maintenance of pumping systems. The course will highlight:

- Principles of efficient and trouble-free operation of pumping equipment
- Condition monitoring procedure
- Importance of proper selection of pumping system for the given application
- Explanation of the root cause of various problems related to everyday practice
- Methods of maintenance and repair of pumping system

Who Should Attend?

Mechanical Engineers, General Supervisors, Consulting Engineers, Design Engineers, Foremen, Supervisors, Technicians, Maintenance Personnel, Engineers of all disciplines, Supervisors, Team Leaders and Professionals in Maintenance, Engineering and Production Managers, Maintenance Personnel, Heads of Maintenance and Operation, Chemical Engineers, Equipment Specialists, Technical Engineers, Operation Engineers, Planning Engineers, Process Engineers, Reliability Specialists, Boiler Plant Construction Managers, Consulting Engineers, Design Engineers, Insurance Company Inspectors, Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers, Plant Engineers, Senior Boiler Plant Operators, Repairers and Installers, Process Engineers, Engineers and Technicians who deal with reactors and piping systems, Project Engineers, Control, Automation and Instrumentation Engineers

Course Objectives:

By the end of this course, delegates will be able to:

- Analyze the problems in operation
- Select and properly use different types of pumps
- Optimize the elements of pumping systems
- Use the root cause analysis in problem solving of process equipment
- Apply the best methods of maintenance and problem troubleshooting

Course Outline:

Overview of Various Types of Pumps and their Application

- Main elements of centrifugal pump construction
- Pump Performance Characteristics & Flow Control
- Design of pump-suction piping
- Solving problems in operation: Cavitation & NPSH

Guidelines for Pump Installation and Operation

- Condition monitoring
- Seals & bearings: Selection and problems in operation
- Inspection and performance testing
- Maintenance and troubleshooting

Pump Classification

- Positive Displacement Pumps
- Dynamic Pumps

Basic Hydraulic & Pump Concepts & Definitions

- Defining Pressure
- Head
- Specific Gravity
- Why Head Instead of Pressure?

How Centrifugal Pumps Work

- How Centrifugal Pumps Induce Flow

Net Positive Suction Head (NPSH)

- NPSHR vs. NPSHA
- Pump Cavitation
- NPSH Margin

Horsepower & Efficiency

- Losses

- Calculating Efficiency
- Effects of Viscosity

Reading Pump Curves

- Single Line Curves
- Multiple Trim Curves
- Multiple Speed Curves
- Affinity Laws

Pump System Curves

- Calculating System Heads
- Where The Pump Will Operate
- Changes in the System Curve
- Determining a Pump's Operating Point

Effect of Pump Operation on Mechanical Reliability

- Axial & Radial Loads
- Shaft Deflection
- Seal & Bearing Life
- Start Up and Commissioning Procedures
- Minimum Flow Restrictions

Specifying the Right Pump

- Matching the Right Pump for the Job

Bearings

- Lubrication Methods

- Failure Modes
- Proper Maintenance
- Proper Lubricant Care

Seals & Packing for Pumps

- Packing
- Types of Packing
- Proper Packing Installation
- Correctly Adjusting Packing
- Mechanical Seals
- Pusher & Non Pusher Designs
- Single Seals
- Double and Tandem Seals
- Dry Gas Seals
- Other Sealing Methods

Good Pump System Design & Installation Practices

- Building Reliability From the Foundation Up
- Alignment
- Types of Misalignment
- Alignment Methods

Optimizing Your Pump Operation

- Pump Energy Efficiency
- Improved Reliability
- Better Process Control
- Effect of Pump Speed on Pump Life

Pump Troubleshooting

- Common Pump Problems and Their Solutions
- Root Cause Analysis

Condition Monitoring of Pumps

- Vibration Analysis
- Lubricant Analysis
- Alternative Methods

Positive Displacement Pumps: Reciprocating and Rotary

- Pumps for special applications
- Guidelines for pump installation and operation
- Pump inspection, control and performance testing
- Maintenance and troubleshooting