

Pumps and Pumping Systems Training Course Contents

Pumping course content includes Centrifugal Pumps and Pumping Systems design, use and maintenance for maintenance managers, engineers, supervisors and pump maintainers

The Design and Engineering for High Pumping System Reliability

- Key Concepts in Designing for Pump Reliability
 - Life-cycle Effect on Costs and Profits
 - Defect and Failure True Costs
 - Risk and Probability of Failure
 - Physics of Failure
 - Degradation Curve – Degradation Causes
 - Reliability Growth Cause Analysis
 - The Process Maps for Reliability
 - FMECA/FMEA/RCM
 - Maintainability and Supportability
 - Stores and Storage Practices

- Pumping System Failures
 - Hydraulic Gradient and Piping Losses
 - Pump Head and Flow
 - System Curves
 - Anti-Cavitation Considerations
 - NPSH
 - Cavitation
 - Non-steady Duty
 - Distortion Prevention
 - Degradation Management
 - Case Study - Practical Examples

- Pump Set Selection
 - Pump Types and Their Limitations
 - Duty Conditions
 - Process Conditions
 - Cavitation Conditions
 - Specific Speed
 - Centrifugal Impeller Types and Selection
 - Efficiency and Power Draw
 - Best Efficiency Point
 - Energy Efficiency
 - Shaft Rigidity and Deflection
 - Bearing Housing and Bearing Selection
 - Shaft Seal Selection
 - Purchasing Specification
 - Supplier Provided Documentation

- Pump Installation Design
 - Best-Practice Engineering Design
 - Component Standardisation
 - Suction Conditions
 - Foundations
 - Base Frames
 - Hold-down Bolting
 - Piping and Valves
 - Pipe Expansion and Alignment
 - Vapour/Air Pockets
 - Maintainability

Installing, Operating and Maintaining Pumping Systems and Installations

- Pump Installation

- Engineering Specifications
 - Installation Procedures for Work Quality Assurance
 - Instrumentation and Process Control
 - Transmitted Vibration Control and Isolation
 - Piping Orientation and Connections
 - Addressing Piping Stress
 - Shaft Seal Flushing
 - Precision Shaft Alignment Requirements
 - Performance Testing, Commissioning and Acceptance
-
- Pump Operation
 - Operator and Process Interface
 - Operating Procedures for Process Stability
 - Operator Training
 - Performance Monitoring
 - Performance Degradation
 - Operator Watch-keeping
-
- Pump Maintenance and Reliability
 - Maintenance and Reliability Strategy
 - Component Failure Curves
 - Defect Elimination
 - System Reliability
 - Life Cycle Costs
 - Condition Monitoring and Predictive Maintenance
 - Preventive Maintenance
 - Maintenance Procedures for Work Quality Assurance
 - Lubrication Standard
 - Balancing Standard
 - Alignment Standard
 - Bearing Vibration Standard
 - Precision Maintenance

The Pumps and Pumping Training content covers important issues such as:

- True cost of failure
- Know the process and chemical properties and characteristics
- Pump Types Overview – centrifugal, helical rotor, gear, piston, diaphragm, etc
- Pump type characteristics and normal operation
- Foundation and base – construction, distortion, soft foot
- Balancing and shaft alignment
- Seals – mechanical, packing

- Valving – types and characteristics
- Installation – stainers, valving, pipe stress, expansion
- Pressure head – basics of pressure, basics of pipe friction
- Suction conditions- Liquid supply, tank location, head pressure, cavitation
- Discharge conditions – friction loss, system head
- Commissioning/decommissioning/start-up – direction checking, priming, valve positions
- Operation – process impact, fluctuating conditions
- Maintenance – equipment records, PM's, condition monitoring, operator observation
- Reliability – trending performance, monitoring equipment condition
- FMEA/RCM maintenance strategy selection
- Hydraulic energy, pressure losses in piping and pipe fittings
- Piping system design, supply and receiving tankage
- Pressure head, NPSH and pressure loss calculations
- Pump curve
- Pumping system characteristic curve, suction head, energy reduction
- Pump selection, material selection, motor characteristics
- Drive motor selection, shaft coupling selection
- Reliability – design, components, operation, alignment, balance
- Installation requirements – rigidity, distortion, piping, maintainability, operability
- Condition monitoring – vibration, lubricant, temperature
- Seals – operation, mechanical, packing, selection issues, maintenance problems
- Process control, process requirements, operatibility, maintainability
- Operator skills, maintenance skills
- Purchasing documentation, engineering specification, quality inspections