



MUE115

Practical Pump Technology: Selection, Operation and Maintenance

Course Introduction:

This course provides a comprehensive understanding of the various types of reciprocating, rotary, and centrifugal pumps. This includes piston pumps, plunger pumps, rotary pumps, screw pumps, two- and three-lobe pumps, cam pumps, vane pumps, bellows-type metering pumps, diaphragm pumps, canned motor pumps, and centrifugal pumps. The characteristics, selection criteria, sizing calculations, sealing arrangements, common problems, repair techniques, as well as the preventive and predictive maintenance of these pumps are covered in detail.

This course is a MUST for those who use this equipment. It covers how pumps operate and provides the guidelines and rules that must be followed for their successful application. This program provides the following for all types of pumps and bearings:

- Basic Design
- Specification
- Selection Criteria
- Sizing Calculations
- Sealing Arrangements
- Common Operational Problems
- All Diagnostics, Troubleshooting, and Maintenance Required for this Equipment
- Pump Drivers

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Maximize the efficiency, reliability, and longevity of all types of pumps
- ✓ Size and select out of the various types of dynamic and positive displacement pumps using the performance characteristics and the selection criteria that you learn in this program
- ✓ Carry out diagnostic testing and inspection of critical components with the knowledge of common failure modes of pumps by applying advanced fault detection techniques.
- ✓ Select bearings and lubrication, pump sealing arrangements, meet commissioning requirements, troubleshoot, provide predictive and preventive maintenance, enhance reliability, and reduce cost.
- ✓ Determine the maintenance required to minimize pump downtime and operating cost and maximize its efficiency, reliability, and useful life.
- ✓ Gain a thorough understanding of pump characteristics.
- ✓ Understand all the causes of failures in pumps.
- ✓ Determine all the design features that improve the efficiency and reliability of all pumps.
- ✓ Design different types of pumping systems.
- ✓ Gain a thorough understanding of the various types of sealing arrangements used in compressors.

Who Should Attend?

This course is intended for engineers of all disciplines, managers, technicians, maintenance personnel and other technical individuals.

Course Outline:

Day 1:

Pumps

- Pump Terminology
- Nomenclature and Definitions
- Pump Types

Centrifugal Pumps

Centrifugal Pump Theory

- Operating Characteristics
- Centrifugal Pump Operation
- Cavitation and NPSH
- Elements of Minimum Continuous Safe Flow (MCSF)
- How to Calculate MCSF
- Types of Centrifugal Pumps

Day 2:

Centrifugal Pump Specification and Selection

Selecting a Pump Vendor

- Industry Standards
- API vs. ANSI Standards
- Driver Size Selection
- Variable Speed Drive Selection
- Pump Design Audit/Review

Centrifugal Pump Maintenance and Repair Parts of Centrifugal Pumps

- Bearing Basics
- Balancing Criteria
- Installation and Startup

Day 3:

Troubleshooting Centrifugal Pumps

- Inspecting Centrifugal Pump Components for Wear

- Centrifugal Pump Overhaul
- Case Studies

Positive Displacement Pumps: Reciprocating Pumps

- NPSH Requirement for Reciprocating Pumps · Rotary Pump Theory and Operation
- PD Pumps in the Operating System
- How to Select Progressing Cavity Pumps

Day 4:

Special Purpose PD Pumps/Fluid Metering System Design and Options

- PD Metering Pumps, Plunger Pumps, Diaphragm Pumps, Rotary Metering Pumps
- Controlling Pulsation and Surge

Pump Categories, Centrifugal Pumps, and Mechanical Seals

- Pump Categories: Dynamic (Centrifugal) and Positive Displacement (Reciprocating and Rotary)
- Centrifugal Pumps: Operation, Casings and Diffusers, Hydrostatic Pressure Tests, Impellers, Hydraulic Balancing Devices, Mechanical Seals, Minimum Flow Requirement, Performance
- Characteristics, Cavitation, and Net positive Suction Head
- Centrifugal Pump Mechanical Seals, Components, Temperature Control, Seal Lubrication/Leakage, Applications, Types of Mechanical Seals, Common Failure Modes of Seals, Seal Refurbishment
- Maintenance Recommended for Centrifugal Pumps
- Vibration Analysis and Predictive Maintenance

Day 5:

Positive Displacement Pumps, Troubleshooting, Maintenance, and Selection of Pumps

- Reciprocating Pumps, Piston Pumps, Plunger Pumps, Rotary Pumps, Screw Pumps, Two- and Three-Lobe Pumps
- Cam Pumps, Vane Pumps, Bellows-Type Metering Pumps
- Diaphragm Pumps
- Canned Motor Pumps, Seal-less Pump Motors
- Pump Maintenance, Inspection, Overhaul, Diagnoses of Pump Troubles
- Troubleshooting of Centrifugal Pumps
- Troubleshooting of Rotary Pumps
- Troubleshooting of Reciprocating Pumps
- Water Hammer
- Smart Instrumentation
- Pump Selection
- Pumping System Calculations

- Workshop: Design and selection of Different Pumping Systems for the Oil and Gas Industry, and the Power Generation Industry
- Vibration Analysis and Predictive Maintenance
- Diagnostics of Pumping Systems
- Pump Drivers

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per the course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee/Tea
08:20 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Coffee/Tea/Snacks)
13:30 - 15:00	Last Session

