

**Training Title**

**PRACTICAL PUMP TECHNOLOGY: SELECTION, OPERATION & MAINTENANCE**

**Training Duration**

5 days

**Training Dates & Venue**

REF ME037	Practical Pump Technology: Selection, Operation & Maintenance	5	05-09 Feb 2024	\$5,500	Dubai, UAE
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Training will be held at any of the 5-star hotels. The exact venue will be informed once finalized.

**Training Fees**

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch

**Training Certificate**

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

**TRAINING OVERVIEW**

**TRAINING DESCRIPTION**

Pumps are versatile and important fluid machines that almost found in all engineering processes and applications. There are two main types of pumps: namely positive displacement and rotodynamic pumps. The first type may be classified as reciprocating and rotating pumps. Piston, plunger and diaphragm pumps represent the reciprocating pumps, while gear, screw lobe and sliding vane pumps represent the rotating pumps. The second type, namely the rotodynamic pumps may be centrifugal pumps, mixed-flow pumps and axial-flow pumps. Without pumps there would be no flow in pipes, tubes, conduits or equipment. Pumps create the pressure or head required to overcome friction loss due to flow and losses due to change in magnitude or direction of the flow as well as any shock losses. Also, pumps charge the fluid by the head to overcome gravity and increase the fluid potential energy. Mechanical seals play an important role in pumps to prevent leakage. A mechanical seal must contain four functional components primary sealing surfaces, secondary sealing surfaces, a means of actuation and a means of drive.

**TRAINING OBJECTIVES**

The basic and advanced pump technology is required to:

- Differentiate between different types of pumps
- Know and recognize the pump component and structure
- Help learning how to successfully operate the pump
- To diagnose the problems of operation as cavitation causes and overcoming these causes.

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- Understand the causes of axial and radial thrust in pumps
- Successfully select, troubleshoot and maintain pumping equipment.

### WHO SHOULD ATTEND?

This course is designed for:

- Operators, and maintenance groups
- Engineers and supervisors as well as those in the design of piping systems
- Responsible engineers for purchasing and commissioning pumps

### TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivate everybody to find the right answers. The delegates will also be encouraged to raise their own questions and to share in the development of the right answers using their own analysis and experiences. Tests of the multiple-choice type will be made available on a daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

### COURSE CONTENTS:

- 1- Introductory & Review of Fluid Mechanics and Fluid Machines
- 2- Pump Types and Specifications
- 3- Centrifugal Pump selection
- 4- Sealing Systems
- 5- Series and Parallel Connections
- 6- Centrifugal Pump Priming.
- 7- Pump Cavitation.
- 8- Axial and Radial Thrust.
- 9- Pump Operation and Maintenance and Troubleshooting.

### DAILY COURSE OUTLINE

#### **Day One:**

- 1- Some fluid properties and pressure concept

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- Velocity, density, viscosity, specific gravity, volume and mass flowrate
- Gauge and absolute pressure

## 2- Pump Types and Specifications

- Rotodynamic Pumps.
  - i. Types of Rotodynamic Pumps
  - ii. Pump Impellers
  - iii. Pump Casings
- Positive Displacement Pumps (PDPs)
  - i. Reciprocating Positive Displacement Pumps
  - ii. Rotary Positive Displacement Pumps

### Day Two:

- 3- Pump Selection
  - Pipeline Losses (primary and secondary losses)
  - System Curve
  - System Curve Changes
  - Pump Selection and Matching with Pipeline
- 4- Centrifugal Pump Design and Technology
  - Pump Specific Speed
  - Charts Between Specific Speed and Best Efficiency

### Day Three:

- 5- Series and Parallel Connections
  - Series Operation
  - Parallel Operation
- 6- Centrifugal Pump Priming.
  - System of Foot Valve Strainers and Filling Funnel and Vent
  - Priming Tank
  - System of Evacuating the Pump and Suction Line

### Day Four:

- 7- Pump Cavitation.
  - Vapor Pressure of a Liquid
  - Calculation of (NPSH)<sub>a</sub> of a Pumping Unit
  - Determination of (NPSH)<sub>r</sub> of a Pump
  - Relation of (NPSH)<sub>a</sub> and (NPSH)<sub>r</sub>
- 8- Axial and Radial Thrust.

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- Axial Thrust and Methods of its Elimination or reduction
- Radial thrust and Methods of its Elimination or reduction

**Day Five:**

- 9- Pump Operation and Maintenance and Troubleshooting.
- 10- Sealing Systems
  - Types of Leaks
  - Labyrinth and Stuffing Box • Mechanical Shaft Seals

**NOTE:**

**Pre & Post Tests will be conducted.**

**Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.**



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