# PRACTICAL PUMP TECHNOLOGY: SELECTION, OPERATION & MAINTENANCE

TRAINIT ACADEMY

MUE239
Mechanical &
Utility
Engineering

**COURSE TITLE**

# PRACTICAL PUMP TECHNOLOGY: SELECTION, OPERATION & MAINTENANCE

**COURSE DATE/VENUE**

05 - 09 April, 2021

London, UK

**COURSE REFERENCE**

MUE239

**COURSE DURATION**

05 Days

**DISCIPLINE**

Mechanical & Utility Engineering

**COURSE INTRODUCTION**

Pumps are versatile and important fluid machine 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 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.

## COURSE OBJECTIVE

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 operate successfully the pump
- To diagnose the problems of operation as cavitation causes and overcoming these causes.
- Understand the causes of axial and radial thrust in pumps
- Successfully select, troubleshoot and maintain pumping equipment.

## COURSE AUDIENCE

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

## COURSE CONTENT

**Day One:**

### 1- Some fluid properties and pressure concept

• 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

• Pipe Line Losses (primary and secondary losses)

• System Curve

• System Curve Changes

• Pump Selection and Matching with Pipe Line

### 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)a of a Pumping Unit

• Determination of (NPSH)r of a Pump

• Relation of (NPSH)a and (NPSH)r

**8- Axial and Radial Thrust.**

• 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 Leak

• Labyrinth and Stuffing Box • Mechanical Shaft Seals

**COURSE CERTIFICATE**

**TRAINIT ACADEMY** will award an internationally recognized certificate(s) for each delegate on completion of training.

**COURSE FEES**

$6,150 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

**COURSE METHODOLOGY**

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises

- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions