



MUE139

Pumps: Selection, Operation & Troubleshooting

Course Introduction:

On this course you will learn about the parameters affecting pump performance like the type of pump, the type of fluid, the type of service, the type of the drive, the pertinent standards, etc., thus being able to perform the selection process and pump specification correctly.

Delegates will learn how to calculate the piping system head-capacity curve and the NPSH available and select the most matching pump that best serves the system.

Delegates will achieve trouble-free operation of the pump through the understanding of the pump operating range cavitation characteristics.

Learn about the most common causes of failures in pumps like oversizing, misalignment, rotor imbalance, off-design operation, lubrication problems, shaft seals, cavitation, balancing system, and vibration problems.

Methods of problem diagnosis will be discussed using different techniques like vibration analysis, oil analysis, and performance tests, to facilitate troubleshooting and enhance root cause analysis.

Delegates will also have the opportunity to discuss different maintenance best practice like rotor dynamic balance, shaft alignment, bearing installation, performance testing, appropriate operation, seals selection, and lubricant selection.

At the end of the course delegates will be capable of designing and planning an appropriate failure prevention program for the pumping system using Six Sigma DMAIC program.

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Course Objectives:

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

- ✓ Learn the parameters for appropriate selection and pump specification affecting pump performance
- ✓ Perform piping system calculation to select the most matching pump
- ✓ Understand pump operation limits and cavitation characteristics for trouble free operation
- ✓ Explore the most common causes of pump failure to facilitate an effective troubleshooting process
- ✓ Diagnose problems using effective techniques to enhance troubleshooting abilities
- ✓ Adopt best practice for maintenance tasks like rotor dynamic balance, shaft alignment, performance testing and others
- ✓ Design and plan a failure prevention program for the specific pumping system

Who Should Attend?

This course is intended for maintenance engineers, rotating engineers, reliability engineers, operation engineers, operators and technicians.

Course Outline:

Day 1:

Pump Theory

- Pumping Process Concept
- Operating Parameters (Head, Flow, rpm, Power, and Efficiency)
- Pump Types and Terminology

Centrifugal Pump

- Simple Centrifugal Pump
- Classification of Centrifugal Pumps
- Types of Impellers
- Types of Casings
- Basic Pump Theory
- Mechanical Features
- Pump Operation Procedures
- Centrifugal Pumps Troubleshooting
- Pump Applications

Day 2:

Positive Displacement Pumps

- Introduction
- Classification of Positive Displacement Pumps
- Rotary Pumps
- Reciprocating Pumps

Cavitation Phenomena

- Introduction
- The Concept of Cavitation
- General Symptoms of Cavitation and its affects on Pump

Day 3:

Pump Maintenance

- Planned Maintenance
- Predictive and Preventive
- Reliability Programs

Day 4:

Pump Auxiliary System

- Bearings – failure modes and how to extend life.
- Lubrication – different methods of lubrication
- Coupling and Alignment
- Mechanical Seals – maintenance and repair it
- Gland Packing - types and how to change it
- Pump vibration monitors – how to avoid vibration
- Warm up system – why and how it works

Day 5:

Pump Troubleshooting

- Centrifugal Pumps Troubleshooting
- Reciprocating Pumps Troubleshooting
- Rotary Pumps Troubleshooting
- Auxiliary System Troubleshooting
- Power System
- Lube Oil System
- Sealing System
- Warm up System
- Cooling System

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, and-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

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