

CENTRIFUGAL PUMPS & TROUBLESHOOTING - API 610

“Master Pump Selection, Operation, Maintenance and Troubleshooting According to API 610 Standards”

Schedule

Date	Venue	Fees (Face-to-Face)
09 - 13 Feb 2026	Dubai, UAE	USD 3495 per delegate

Introduction

Centrifugal pumps are the backbone of fluid transport systems in process industries. Yet, frequent failures, improper selection, or poor maintenance can lead to severe operational downtime and increased costs. Understanding their performance, design features, and diagnostics is critical for maintaining plant efficiency and safety.

This in-depth 5-day course provides comprehensive knowledge of centrifugal pump design, performance, and API 610 standards. It includes hands-on guidance on troubleshooting techniques and failure analysis, empowering engineers to make data-driven decisions in pump operations and maintenance.

Objectives

By the end of this course, participants will be able to:

- Understand the working principles and configurations of centrifugal pumps
- Apply API 610 specifications for pump design and procurement
- Diagnose common operational problems and mechanical failures
- Perform maintenance planning and reliability improvement practices
- Select the right pump type and size based on system requirements
- Analyze pump performance using curves, NPSH, and hydraulic principles

Why Attend

- Gain a solid foundation in centrifugal pump design and operation
- Learn how to apply API 610 standards in practical environments
- Identify failure modes and apply systematic troubleshooting
- Enhance plant efficiency by optimizing pump selection and performance
- Reduce downtime and maintenance costs through predictive practices

Target Audience

This program is designed for:

- Mechanical, process, and maintenance engineers
- Rotating equipment and reliability professionals
- Maintenance planners and field technicians
- Procurement and project engineers involved in pump specifications
- Engineers working in oil & gas, petrochemical, power, and utility sectors

Individual Benefits

Key competencies that will be developed include:

- Pump selection and specification based on API 610
- Troubleshooting of common pump issues such as cavitation and misalignment
- Understanding of hydraulic and mechanical performance factors
- Enhanced diagnostic and analytical skills for rotating equipment
- Better communication with OEMs and vendors using technical standards

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Improved pump system reliability and reduced maintenance costs
- Better procurement decisions aligned with international standards
- Increased safety through early fault detection and failure prevention
- Higher efficiency and lifecycle optimization of critical assets
- A stronger maintenance and engineering competency in pump systems

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - API 610 requirements, pump theory, and system hydraulics
- Case Studies - Analysis of real-world failures and performance issues
- Workshops - Hands-on fault diagnosis, curve analysis, and system evaluation
- Peer Exchange - Team discussions and sharing of plant experiences
- Tools - Troubleshooting checklists, failure mode charts, selection templates

MAWA EVENTS

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Course Outline

DETAILED 5-DAY COURSE OUTLINE

Training Hours: 7:30 AM - 3:30 PM Daily Format: 3-4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 - 02:00

Day 1: Fundamentals of Centrifugal Pumps and API 610 Overview

- Module 1: Pump Basics and Operating Principles (07:30 - 09:30) • How centrifugal pumps generate flow and pressure • Main components and classifications of centrifugal pumps • Applications across process industries
- Module 2: API 610 Standard Overview (09:45 - 11:15) • Scope and structure of API 610 • Key design and construction requirements • Understanding pump types and configurations under API 610
- Module 3: Pump System Terminology and Definitions (11:30 - 01:00) • Definitions: shutoff head, BEP, NPSH, specific speed • Impact of pump curves and performance indicators • System resistance and interaction with pump performance
- Module 4: Workshop - Identifying API Pump Types (02:00 - 03:30) • Hands-on exercise identifying pump classes and components • Interpreting nameplates and vendor documentation

Day 2: Pump Performance, Sizing and Selection

- Module 1: Understanding Pump Curves (07:30 - 09:30) • Interpreting H-Q, power, and efficiency curves • System curve vs. pump curve intersection • Best Efficiency Point (BEP) and its significance
- Module 2: NPSH, Cavitation, and Suction Considerations (09:45 - 11:15) • Causes and effects of cavitation • NPSHa vs. NPSHr: safe operation guidelines • Mitigation strategies for suction-side issues
- Module 3: Pump Sizing and Selection Criteria (11:30 - 01:00) • Head, flow, fluid characteristics, and system layout • Selecting appropriate materials and seal configurations • Evaluating alternatives based on lifecycle cost
- Module 4: Workshop - Sizing and Selection Exercise (02:00 - 03:30) • Calculate system curves and match with pump curve • Material and sealing selection scenarios

Day 3: Mechanical Design, Installation and Commissioning

- Module 1: Mechanical Design Elements (07:30 - 09:30) • Bearings, seals, shafts, impellers, and casing types • Hydraulic balance and axial thrust management • Design considerations for high-temperature and corrosive fluids
- Module 2: Installation and Alignment Procedures (09:45 - 11:15) • Foundation design and grouting • Shaft alignment techniques and tolerances • Initial start-up checks and procedures
- Module 3: Pump System Commissioning (11:30 - 01:00) • Pre-commissioning checklist • Troubleshooting during start-up • Safety precautions and performance validation
- Module 4: Group Activity - Commissioning Troubleshooting (02:00 - 03:30) • Participants solve a pump start-up problem in teams • Sharing of site-based challenges

Day 4: Pump Troubleshooting and Root Cause Diagnosis

- Module 1: Common Pump Failures and Symptoms (07:30 - 09:30) • Leaks, vibrations, noise, overheating, loss of flow • Symptoms of bearing, seal, or hydraulic issues • Diagnostic techniques and frequency
- Module 2: Root Cause Analysis for Pump Failures (09:45 - 11:15) • Using the "5 Whys" and fault trees • Condition-based indicators and failure modes • Maintenance records and vibration data interpretation
- Module 3: Maintenance and Inspection Strategies (11:30 - 01:00) • Preventive vs. predictive maintenance • Inspection intervals and checklists • Spare parts planning and storage practices
- Module 4: Workshop - Case Study in Pump Failure (02:00 - 03:30) • Analyze a real failure case • Recommend corrective and preventive measures

Day 5: Reliability and Lifecycle Management

- Module 1: Enhancing Pump Reliability (07:30 - 09:30) • Reliability-centered maintenance (RCM) concepts • Design changes to address recurring failures • Operating procedures that extend equipment life

- Module 2: API 610 Procurement and Vendor Interactions (09:45 – 11:15) • Writing specifications based on API 610 • Technical bid evaluations and quality assurance • FAT, SAT, and documentation review
- Module 3: Final Review and Knowledge Consolidation (11:30 – 01:00) • Review of key course takeaways • Summary of API 610 compliance essentials
- Module 4: Wrap-up, Action Planning & Q/A (02:00 – 03:30) • Creating a pump management action plan • Participant presentations and course feedback

Certification

Participants will receive a Certificate of Completion in Centrifugal Pumps & Troubleshooting – API 610, confirming their technical competence in pump design, operations, maintenance, and troubleshooting in line with API 610 standards.

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