

Course No. 1137

Pumps & Pumping Systems Training Course

MECHANICAL ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Pumps & Pumping Systems Training Course is a comprehensive professional development program designed to provide engineers, maintenance professionals, operations personnel, technical specialists, and engineering managers with the knowledge and practical skills required to select, operate, maintain, troubleshoot, and optimize pumps and pumping systems across a wide range of industrial applications. As pumps are among the most critical assets in industrial facilities, their reliable operation is essential for maintaining production continuity, energy efficiency, process safety, and overall operational performance.

Pumping systems are extensively used in oil and gas facilities, power generation plants, water and wastewater treatment plants, manufacturing industries, petrochemical facilities, mining operations, HVAC systems, and infrastructure projects. Poor pump selection, improper operation, inadequate maintenance, and system inefficiencies can result in excessive energy consumption, equipment failures, increased maintenance costs, process interruptions, and reduced asset reliability. This course provides participants with internationally recognized engineering principles and industry best practices that improve pump performance and maximize system efficiency.

Throughout the program, participants will develop a comprehensive understanding of centrifugal pumps, positive displacement pumps, pump components, hydraulic principles, system curves, pump performance characteristics, cavitation, Net Positive Suction Head (NPSH), pump selection, installation requirements, operation, maintenance strategies, reliability improvement, failure analysis, and condition monitoring. Practical engineering applications and real industrial case studies enable participants to connect theoretical concepts with workplace challenges and operational decision-making.

The Pumps & Pumping Systems Training Course also explores the integration of pumping systems with maintenance management, reliability engineering, asset management, energy efficiency, process optimization, safety management, and operational excellence initiatives. By completing this course, participants will be prepared to improve equipment reliability, reduce lifecycle costs, optimize pump performance, enhance operational safety, and support sustainable engineering operations across government entities, ministries, public sector organizations, financial institutions managing engineering infrastructure, oil and gas companies, utilities, manufacturing industries, construction organizations, water authorities, and multinational corporations.

Objectives

- Analyze the operating principles of pumps and pumping systems used in industrial applications.
- Develop practical knowledge for selecting pumps based on process requirements and system characteristics.
- Evaluate pump performance using hydraulic calculations, performance curves, and engineering analysis.
- Apply engineering principles related to fluid mechanics, pump hydraulics, and system design.
- Design efficient pumping systems that improve operational reliability and energy performance.
- Improve pump operation through proper installation, commissioning, monitoring, and maintenance practices.
- Strengthen troubleshooting capabilities by identifying common pump failures and root causes.
- Implement preventive, predictive, and reliability-centered maintenance strategies for pumping systems.
- Assess pump efficiency, energy consumption, and opportunities for system optimization.
- Align pump operation and maintenance practices with organizational safety, reliability, and operational excellence objectives.

Who Should Attend

This course is designed for mechanical engineers, maintenance engineers, operations engineers, reliability engineers, process engineers, plant engineers, utility engineers, project engineers, rotating equipment engineers, maintenance supervisors, operations supervisors, engineering technicians, maintenance planners, engineering inspectors, and technical professionals responsible for pumps and pumping systems.

The program is equally valuable for engineering managers, maintenance managers, operations managers, facility managers, asset management professionals, project managers, technical consultants, procurement engineers, commissioning engineers, quality specialists, HSE professionals, and decision makers responsible for equipment reliability, operational performance, maintenance planning, and engineering asset management.

Professionals working within government entities, ministries, public sector organizations, financial institutions managing engineering infrastructure, oil and gas companies, petrochemical industries,

power generation facilities, water and wastewater utilities, manufacturing plants, mining organizations, infrastructure developers, HVAC operations, marine industries, and multinational engineering organizations will benefit significantly from the practical engineering knowledge and internationally recognized pumping system management practices presented throughout the course.

Learning Outcomes

- By the end of this course, participants will be able to:
- Explain the operating principles and classifications of industrial pumps and pumping systems.
- Select appropriate pumps based on hydraulic requirements, system demands, and operational conditions.
- Interpret pump performance curves and evaluate system operating efficiency.
- Apply fluid mechanics principles to analyze pumping system performance.
- Identify common pump failures and conduct systematic troubleshooting.
- Develop preventive and predictive maintenance plans for pumps and rotating equipment.
- Evaluate cavitation, vibration, seal failures, bearing failures, and other operational problems.
- Improve pump efficiency through system optimization and energy management techniques.
- Apply engineering safety practices during pump installation, operation, inspection, and maintenance.
- Support organizational reliability, operational excellence, and asset performance through effective pump management.

Course Outline

DAY 01

Fundamentals of Pumps and Pumping Systems

- Principles of pump operation and fluid movement
- Types of pumps and industrial applications
- Pump components and construction
- Fundamentals of fluid mechanics and hydraulic principles

DAY 01 — CONTINUED

PRACTICAL

Practical workshop on identifying pump types and interpreting pump specifications

DAY 02

Pump Selection, Design, and System Performance

- Pump performance curves and operating characteristics
- Pump selection methodologies
- System curves and hydraulic calculations
- Net Positive Suction Head (NPSH) and cavitation prevention

PRACTICAL EXERCISE

Practical exercise on pump sizing and pumping system evaluation

DAY 03

Pump Operation, Monitoring, and Maintenance

- Pump installation and commissioning best practices
- Operating procedures and performance monitoring
- Preventive and predictive maintenance strategies
- Lubrication, alignment, and mechanical seal management

PRACTICAL

Practical workshop on maintenance planning and operational inspections

DAY 04

Troubleshooting, Reliability, and Performance Optimization

- Common pump failures and root cause analysis
- Vibration analysis and condition monitoring
- Reliability improvement methodologies for rotating equipment

DAY 04 — CONTINUED

- Energy efficiency and pumping system optimization

PRACTICAL APPLICATION

Practical application involving troubleshooting industrial pump failures and performance improvement

DAY 05

Advanced Pump Management and Operational Excellence

- Asset management strategies for pumping systems
- Safety management and operational risk reduction
- Pump lifecycle management and continuous improvement
- Performance measurement and engineering best practices

FINAL WORKSHOP

Final workshop involving the development of a comprehensive Pumps & Pumping Systems management plan integrating pump selection, hydraulic analysis, maintenance planning, reliability improvement, energy optimization, condition monitoring, safety management, and continuous improvement to maximize equipment performance and operational excellence.

Register or Request More Information

Course page: <https://quest-training.com/courses/pumps-pumping-systems-training-course>

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