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COURSE BROCHURE

# Pump and Valve Selection, Sealing and Troubleshooting Training Course

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Registered in the United Kingdom and Saudi Arabia

# Pump and Valve Selection, Sealing and Troubleshooting Training Course

Pump and Valve Selection, Sealing and Troubleshooting is a 1-week training course for mechanical technicians, engineers and maintenance supervisors who build a pump and valve fault diagnosis sheet for one critical service. Seal leaks, cavitation damage and passing valves still cause lost throughput and safety incidents in process plants. Jupiter Prime Training runs this course on pump and valve selection, sealing and troubleshooting.

## Why Pump and Valve Selection, Sealing and Troubleshooting Matters Now

Three forces shape how plants treat rotating and flow-control equipment today. Energy costs push operators to run pumps near their best efficiency point instead of throttling. Tighter emission and leak-detection expectations put mechanical seals, packing and valve stem leakage under closer scrutiny. Sites that match pumps to the system curve see longer seal life and fewer trips; others pay in repeat repairs. The course rests on the asset-focused maintenance vocabulary of EN 13306 and the asset management principles of ISO 55001.

## Who Gains Most from Pump and Valve Selection, Sealing and Troubleshooting

- Technicians who strip, rebuild and align centrifugal and positive displacement pumps on site
- Rotating equipment engineers who specify pumps and seals
- Instrument and valve specialists who select, size and set up control and isolation valves
- Supervisors who decide whether to repair or replace a failing unit
- Reliability staff who trend vibration and leakage

A mixed crew from one pump house or tank farm gains most when several members attend together.

## Pump and Valve Selection, Sealing and Troubleshooting Capabilities

Participants learn to read a pump in its system, choose a sealing arrangement and trace a flow fault to its mechanical source.

- Calculate the operating point from pump and system curves — rerate or impeller trim decisions
- Assess net positive suction head margin against cavitation risk — suction piping changes
- Specify mechanical seal type and flush plan for a given fluid — seal vendor enquiries
- Size a control valve using flow coefficient and rangeability — instrument engineers
- Test isolation valves for seat leakage and classify the result — permit-to-work authorities
- Apply a symptom-to-cause diagnostic tree to pump and valve faults — shift supervisors

## Key Pump and Valve Selection, Sealing and Troubleshooting Terms

- Best Efficiency Point BEP — the flow rate at which a centrifugal pump converts shaft power into hydraulic power with the least loss.
- Net Positive Suction Head NPSH — suction pressure margin above vapour pressure; too little causes cavitation.
- Cavitation — formation and collapse of vapour bubbles in the impeller eye, causing noise, vibration and pitting.
- Flow Coefficient Cv — the flow a valve passes at a fixed pressure drop, used to size control valves for a duty.
- Seal Flush Plan — the piping arrangement that cools, cleans or pressurises mechanical seal faces.
- Seat Leakage Class — a graded limit on how much fluid a closed valve may pass, used in acceptance testing.

## Pump and Valve Selection, Sealing and Troubleshooting Day by Day

### Day 1: Pumping Systems in Context

- System Resistance Curve Construction — Where a Pump Will Really Run
- Centrifugal Versus Positive Displacement Duty Mapping — Pump Type Selection
- Specific Speed and Impeller Geometry — Matching Design to Head and Flow
- Energy Cost of Throttled Operation — Variable Speed Drive Business Case
- Pump Data Sheet Review — Gaps Before Procurement or Rerate

### Day 2: Hydraulic Behaviour and Cavitation

- Performance Curve Reading and Affinity Laws — Speed and Trim Changes
- NPSH Available Versus Required Calculation — Suction Layout Corrections
- Recirculation and Minimum Flow Protection — Bypass Line Sizing
- Parallel and Series Pump Operation — Spare Philosophy and Staging
- Reciprocating and Screw Pump Pulsation Control — Dampener Selection

### Day 3: Sealing, Bearings and Alignment

- Packing Versus Mechanical Seal Comparison — Leakage and Upkeep Trade-Offs
- Single, Double and Tandem Seal Arrangements — Hazardous Fluid Containment
- Seal Flush and Barrier Fluid Plans — Face Temperature Control
- Bearing Lubrication and Housing Protection — Oil Contamination Prevention
- Laser Shaft Alignment and Soft Foot Checks — Coupling and Seal Life

### Day 4: Control and Isolation Valves

- Globe, Ball, Butterfly and Gate Valve Characteristics — Service Matching
- Control Valve Sizing with Cv and Rangeability — Stable Loop Response
- Actuator and Positioner Selection — Fail-Safe Action and Stroke Speed
- Seat and Stem Leakage Testing — Acceptance Class and Repack Decisions
- Flashing, Choked Flow and Trim Erosion — Anti-Cavitation Trim Choice

## Day 5: Practising the Pump and Valve Fault Diagnosis Sheet

- Vibration and Temperature Signature Reading — Separating Hydraulic from Mechanical Faults
- Case Study from a Water Utility Pump Station — Cavitation Root Cause
- Case Study from a Refinery Product Line — Passing Control Valve
- Repair, Rerate or Replace Comparison — Supervisor Sign-Off Criteria
- Pump and Valve Fault Diagnosis Sheet Completion — Peer Challenge and Handover

## Applying Pump and Valve Selection, Sealing and Troubleshooting After the Course

- Plot the actual operating point of one bad-actor pump on its curve and propose a correction.
- Run a seat leakage survey on the isolation valves of one critical line.

## Pump and Valve Selection, Sealing and Troubleshooting Questions FAQ

### What is pump and valve selection, sealing and troubleshooting, and why does it matter now?

It is the practical skill of matching pumps and valves to their duty, sealing them correctly and diagnosing faults. It matters now because energy costs and leak scrutiny make every repeat failure more expensive.

### Which roles gain most from pump and valve selection, sealing and troubleshooting?

Fitters, rotating equipment engineers, valve specialists and maintenance supervisors gain most. The course links hydraulic theory to what you see on the plant floor.

### How does a pump and valve selection, sealing and troubleshooting course differ from a valve maintenance course?

It covers the whole pumping system rather than valve overhaul alone. Here you also read pump curves, prevent cavitation, choose seals and size control valves.

### What do you bring back from pump and valve selection, sealing and troubleshooting?

You bring back a completed fault diagnosis sheet for one critical service. It records the operating point, seal arrangement, valve condition and first corrective actions.

## Pump and Valve Selection, Sealing and Troubleshooting: The Way Forward

The pump and valve fault diagnosis sheet first informs whether a recurring failure needs a repair, a rerate or a redesign. Fitters, engineers and supervisors use it to plan work and spares, and attach it to work orders so the next crew starts from recorded evidence. After its first use, revisit the system curve assumptions, because process conditions drift over time.