JUPITER PRIME
Consulting • Training • Advisory
جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Advanced Compressor Surge Control and Dry Gas Seals Training Course

1 – 12 March 2027
Geneva

Advanced Compressor Surge Control and Dry Gas Seals Training Course

Ref: 859_32514 **Date:** 1 – 12 March 2027 **Location:** Geneva **Fees:** 12500 GBP

Compressor Surge Control and Dry Gas Seals is a 2-week training course for rotating equipment engineers and compressor technicians who protect centrifugal, reciprocating and screw machines, and it builds a compressor protection and seal condition dossier for one train. Surge events, seal gas contamination and lubrication faults now drive many unplanned trips, flaring and emissions concerns. Jupiter Prime Training delivers Compressor Surge Control and Dry Gas Seals with a focus on machine-level decisions.

Why Compressor Surge Control and Dry Gas Seals Matters Now

Three forces shape compressor protection today. Operators run gas and process compressors across wider turndown as feed rates and gas compositions shift, pushing operating points towards the surge line. Emission expectations make seal leakage and vent flows visible to environmental and operations stakeholders. Experienced specialists are retiring, so anti-surge tuning and seal panel knowledge must be written down. A site that handles this well keeps trains on line, avoids thrust bearing and seal damage and plans overhauls on evidence; one that handles it badly faces repeat trips and costly rotor repairs. The course rests on ISO 55001 for asset management systems and EN 13306 for maintenance terminology.

Who Gains Most from Compressor Surge Control and Dry Gas Seals

- Engineers responsible for compressor performance curves, operating envelopes and efficiency tracking
- Specialists who configure, tune and test anti-surge controllers and recycle valves
- Technicians who maintain dry gas seal panels, buffer gas supply and separation seals
- Reliability staff who analyse trips, vibration trends and lubrication oil condition
- Planners who scope compressor overhauls, spares and inspection windows

A compressor station or process unit crew gains most when its rotating equipment engineer, control specialist and seal technician attend together and agree one protection philosophy.

Compressor Surge Control and Dry Gas Seals Capabilities

Participants move from reading a performance map to defending the margins, seal settings and overhaul scope that keep each machine safe.

- Calculate surge margin and control line offsets from field data — anti-surge tuning decisions
- Assess dry gas seal leakage, primary vent trends and buffer gas quality — seal replacement timing
- Weigh recycle, throttling and speed control options for turndown — operations and energy stakeholders
- Apply valve, rider band and packing diagnostics to reciprocating machines — overhaul priorities

- Specify lubrication oil sampling, filtration and seal oil limits — reliability and laboratory staff
- Build an evidence-based compressor overhaul scope — planners and plant management

Key Compressor Surge Control and Dry Gas Seals Terms

- Surge — a flow reversal in a dynamic compressor when head capacity falls below system resistance, causing violent pressure and thrust oscillation.
- Surge control line — a line set at a margin to the right of the surge line where the anti-surge controller begins to open the recycle valve.
- Dry gas seal — a non-contacting mechanical seal in which spiral grooves lift the rotating face on a thin film of filtered gas.
- Primary vent flow — the gas leaking past the inboard seal stage and routed to flare or vent, used as the main seal health indicator.
- Polytropic efficiency — the ratio of ideal polytropic head to actual work absorbed, used to track compressor fouling and internal wear.
- Rod drop — the measured vertical movement of a reciprocating piston rod that indicates rider band wear in non-lubricated cylinders.

Compressor Surge Control and Dry Gas Seals Day by Day

Day 1: Compressor Duty and Operating Envelopes

- Centrifugal, Reciprocating and Screw Duty Comparison — Machine Selection for Each Service
- Gas Composition and Molecular Weight Effects — Head and Power Shifts
- Performance Map Reading — Stonewall, Surge and Speed Limits
- System Resistance Curves — Matching Process Demand to Machine Capability
- Failure History Review by Machine Type — Where Protection Effort Pays Back

Day 2: Surge Mechanics and Detection

- Rotating Stall and Surge Cycle Physics — Damage Mechanisms to Thrust Bearings
- Flow Element and Differential Pressure Signals — Measurement Accuracy at Low Flow
- Surge Line Field Testing — Verifying Vendor Curves Against Reality
- Surge Event Signatures in Trend Data — Trip Investigation Evidence
- Parallel and Series Train Interaction — Load Sharing Risks

Day 3: Anti-Surge Control Design

- Surge Control Line Margin Setting — Safety Versus Recycle Energy Loss
- Recycle Valve Sizing and Stroke Speed — Response to Fast Transients
- Controller Algorithms and Open-Loop Steps — Protection During Emergency Shutdown
- Hot Gas Bypass and Cooler Placement — Recycle Temperature Limits
- Controller Tuning and Test Records — Commissioning Acceptance Decisions

Day 4: Capacity and Efficiency Control

- Polytropic Head and Efficiency Calculation — Fouling and Wear Detection
- Variable Speed Versus Suction Throttling — Energy Cost of Turndown
- Inlet Guide Vane Adjustment — Part-Load Efficiency Gains
- Reciprocating Clearance Pockets and Unloaders — Stepless Capacity Choices
- Screw Compressor Slide Valve Control — Matching Volume Ratio to Duty

Day 5: Dry Gas Seal Design and Support Systems

- Tandem and Double Seal Arrangements — Choosing the Seal Configuration
- Spiral Groove Face Lift Principles — Running Clearance and Speed Limits
- Seal Gas Conditioning Skids — Filtration, Heating and Dew Point Margin
- Separation Seals and Nitrogen Supply — Preventing Oil Migration to Faces
- Seal Panel Alarms and Trip Logic — Response Settings for Operators

Day 6: Seal Failure Diagnostics

- Primary and Secondary Vent Trending — Early Warning of Face Damage
- Liquid and Particle Contamination Paths — Root Cause of Seal Failures
- Reverse Pressurisation and Slow Roll Risks — Start-Up Procedure Changes
- Seal Teardown Findings Interpretation — Repair or Replace Decisions
- Wet Oil Seal Conversion Assessment — Emission and Reliability Trade-Offs

Day 7: Lubrication and Bearing Health

- Lube Oil Console Design and Accumulators — Coast-Down Protection
- Oil Analysis Limits for Varnish, Water and Wear Metals — Oil Change Timing
- Tilting Pad Journal and Thrust Bearing Temperatures — Load Trend Alarms
- Cylinder and Packing Lubrication Rates — Reciprocating Wear Control
- Screw Compressor Oil Injection and Separation — Carry-Over Prevention

Day 8: Reciprocating and Screw Machine Diagnostics

- Pressure-Volume Card Analysis — Valve and Ring Leakage Detection
- Rod Load and Rod Reversal Checks — Crosshead Pin Protection
- Rod Drop and Packing Leak Monitoring — Rider Band Replacement Timing
- Rotor Clearance and Bearing Wear in Screw Machines — Rebuild Scheduling
- Pulsation and Piping Vibration Surveys — Damper and Orifice Changes

Day 9: Overhaul Planning and Spares Strategy

- Condition-Based Overhaul Triggers — Interval Extension or Early Intervention
- Rotor, Bundle and Seal Cartridge Spares — Critical Spares Holding Decisions
- Overhaul Scope and Inspection Test Plans — Shop Versus Field Repair
- Alignment, Balancing and Clearance Records — Return-to-Service Acceptance
- Life-Cycle Cost of Compressor Interventions — Budget Prioritisation Across Trains

Day 10: Practising the Compressor Protection Dossier

- Surge Margin Verification Exercise — Applying Field Test Methods
- Seal Vent Trend Diagnosis Case — Applying Contamination Root Cause Methods
- Efficiency Recovery Options Appraisal — Applying Polytropic Performance Tracking
- Overhaul Scope Defence Session — Applying Condition Trigger Evidence
- Compressor Protection and Seal Condition Dossier — Completing the Train Record

Applying Compressor Surge Control and Dry Gas Seals After the Course

- Lead a surge margin review on one critical compressor, comparing the controller's surge control line with recent field test data and trip records.
- Set up primary vent and seal gas filter differential pressure trending for each dry gas seal, with alarm levels agreed between operations and maintenance.

Compressor Surge Control and Dry Gas Seals Questions FAQ

What is compressor surge control and dry gas seals work, and why does it matter now?

It is the discipline of keeping compressors away from flow reversal and keeping their seals healthy. Wider turndown, emission scrutiny and fewer experienced specialists make it urgent, because one surge or seal failure can stop a gas train and damage the rotor.

Which roles gain most from compressor surge control and dry gas seals training?

Rotating equipment engineers, control specialists, seal technicians, reliability staff and overhaul planners gain most. You benefit further when colleagues from operations and maintenance attend together, because surge settings and seal alarm responses cross both functions.

How does compressor surge control and dry gas seals training differ from a general rotating equipment course?

It goes deeper into one machine family. A general rotating equipment course spreads time across pumps, fans and turbines, while this one concentrates on surge physics, anti-surge tuning, seal support systems and compressor-specific diagnostics and overhaul planning.

What do you bring back from compressor surge control and dry gas seals training?

You bring back a protection and seal condition record for one compressor train. It holds verified surge margins, seal vent baselines, lubrication limits and a defended overhaul scope that your team can use straight away.

Compressor Surge Control and Dry Gas Seals: The Way Forward

The compressor protection and seal condition dossier first informs whether the current surge control line and seal alarm settings are safe for today's gas and duty. Rotating equipment engineers, control specialists and planners use it to agree tuning changes and overhaul timing. After its first use, revisit the efficiency baseline, since fouling and wear shift the performance map over time.