CONCEPT

Mechanical Seals, Shaft Alignment and Bearings: Precision Maintenance Practice

4 – 8 April 2027
Dammam - Eastern Province five-star



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Ref: 415_13805 **Date:** 4 – 8 April 2027 **Location:** Dammam - Eastern Province five-star **Fees:** 19500 SAR

Introduction:

Mechanical seals, shaft alignment and bearings decide how long a rotating machine runs after a repair, yet many repeat failures start at the workbench: a seal set with the wrong face loading, a coupling left out of tolerance, a bearing forced onto its shaft. This Core Concept precision maintenance course trains technicians and engineers to install seals and gland packing, select couplings, align shafts, mount and lubricate bearings, and read failed parts to find the installation cause. Participants build a Precision Maintenance Job Checklist Pack for machines at their own site.

Course Objectives:

- Apply precision maintenance tolerances and measuring tools to baseplates, shafts and fasteners so that every repair starts from verified as-found readings
- Install cartridge and component mechanical seals and gland packing correctly, and recognise seal arrangements and flush plans at overview level
- Select couplings and align shafts by rim-and-face, reverse indicator and laser methods, correcting soft foot and allowing for thermal growth
- Mount, dismount and lubricate rolling bearings with the correct fits, internal clearance and cold, heating or hydraulic method
- Analyse failed seals and bearings, classifying bearing damage with ISO 15243 concepts, and trace each failure to its installation or operating cause
- Build precision maintenance job checklists with tolerance values that crews apply on every seal, alignment and bearing job

Target Audience:

- Mechanical technicians and fitters responsible for seal, coupling and bearing replacement on pumps, fans, motors and gearboxes
- Rotating equipment and maintenance engineering staff responsible for repair quality and overhaul acceptance
- Reliability engineering staff responsible for removing repeat failures that follow maintenance work
- Workshop supervisors responsible for tooling, repair standards and job sign-off
- Condition monitoring staff who pass alignment, unbalance and bearing findings to crews for correction

Course Outline:

Day 1: Precision Maintenance Foundations and Machine Baseline

- Precision Maintenance Concept: Tolerances, Repeatability and Post-Overhaul Failures That Erode Reliability
- Precision Tool Kit: Micrometers, Feeler Gauges, Torque Wrenches, Dial Indicators and Laser Systems
- Baseplate Flatness, Grout Condition and Pipe Strain Checks Before Alignment
- Rotor Unbalance at Overview: Static, Couple and Dynamic Types with Shop Versus In-Situ Correction
- Workshop Baseline Survey Sheet: As-Found Readings, Shaft Runout and Fastener Condition

Day 2: Mechanical Seals and Gland Packing

- Mechanical Seal Components: Rotating and Stationary Faces, Secondary Seals, Springs and Gland Plate
- Pusher, Bellows, Cartridge and Split Seal Designs with Face Material Pairings
- API 682 Seal Categories, Arrangements and Flush Plans at Overview
- Cartridge Seal Fitting Sequence: Shaft Runout, Stuffing Box Squareness, Setting Clips and Face Loading
- Gland Packing Ring Cutting, Staggered Joints and Gland Adjustment with Flax, PTFE and Graphite Packing

Day 3: Couplings and Shaft Alignment Practice

- Coupling Types and Selection: Gear, Grid, Disc, Elastomeric and Jaw Designs
- Soft Foot Detection: Parallel, Angled and Induced Soft Foot with Feeler Gauge Checks
- Rim-and-Face and Reverse Indicator Readings with Bracket Sag Measurement and Move Calculation
- Laser Alignment System Set-Up, Horizontal and Vertical Moves and Shim Pack Correction
- Thermal Growth Offsets: Cold Alignment Targets from Operating Temperature Data

Day 4: Rolling Bearings: Fits, Mounting, Lubrication and Damage

- Rolling Bearing Types: Ball, Cylindrical, Tapered, Spherical and Needle Roller Selection
- Shaft and Housing Fits, Internal Clearance Classes and Clearance Reduction on Tapered Seats
- Bearing Mounting and Dismounting by Cold Press, Induction Heater, Hydraulic Nut and Oil Injection Methods
- Grease and Oil Lubrication: Relubrication Quantity, Interval and Contamination Exclusion
- ISO 15243 Damage Classification by Visual Appearance and Possible Cause

Day 5: Workshop Inspection Walkthrough and Checklist Pack Build

- Mechanical Seal Failure Walkthrough on Returned Seals: Face Wear Tracks, Heat Checking and Elastomer Damage
- Bearing Damage Walkthrough on Removed Bearings with a Root Cause Worksheet
- Alignment Station Exercise: Soft Foot Correction, Laser Readings and As-Left Record
- Precision Maintenance Standards Register: Runout, Alignment, Fit and Fastener Torque Tolerances
- Precision Maintenance Job Checklist Pack Assembly and Peer Review

Skills You Will Gain:

- Precision Measurement Practice
- Mechanical Seal Installation
- Gland Packing Adjustment
- Coupling Selection
- Laser Shaft Alignment
- Soft Foot Correction
- Bearing Mounting and Dismounting
- Seal and Bearing Failure Analysis

Why Attend This Course:

- Return with a Precision Maintenance Job Checklist Pack carrying tolerance values for seal, alignment and bearing work on your own machines
- Break the cycle of seals and bearings failing within weeks of an overhaul
- Read a failed seal face or bearing raceway and tell planners what caused it
- Practise alignment, bearing mounting and seal set-up alongside fitters and engineers from oil and gas, power, water, mining and manufacturing

Conclusion:

Precision maintenance turns seal, alignment and bearing work from craft habit into measured, repeatable practice. The course moves from tolerances, tools and baseplate checks, through mechanical seal components, flush plans and gland packing, to coupling selection, soft foot, dial and laser alignment and thermal growth, and then to bearing fits, mounting, lubrication and damage classification. The final day applies these methods in a workshop walkthrough of failed parts and alignment stations and produces a Precision Maintenance Job Checklist Pack ready for site use.