



Mechanical Engineering

Mechanical Seals Selection, Installation & Troubleshooting

Course Introduction

The course commences with a solid review of the fundamentals, basic principles and looks at seal classification and seal design. Special seal types are examined and the materials used to construct seals ranging from elastomeric materials to be cemented carbides are examined. Through this you will understand the basic needs of mechanical seals, and by applying what you learn you will positively impact on the real costs of seal ownership to your company.

Target Audience

- Automotive Engineer
- Boiler Engineer
- Ceramics Engineer
- Equipment Engineer
- High-Pressure Engineer
- Marine Engineer
- Mechanical Design Engineer
- Mechanical Engineer
- Naval Architect
- Pipeline Engineer
- Power Engineer
- Rotating Equipment Engineer
- Senior Mechanical Engineer
- Turbine Engineer
- Validation Engineer

Learning Objectives

- Demonstrate a sound understanding of the fundamentals of seal selection
- Understand environmental considerations related to seals
- See how the experts repair and rebuild sealed for outstanding performance
- Troubleshoot seals
- Maximize mechanical seal life
- Classify various seals, including special seal types
- Explain considerations related to the materials used in seal construction

Course Outline

• 01 DAY ONE

Module (01) Fundamentals and Principles

- 1.1 Definition of zero leakage
- 1.2 Mechanics of sealing
- 1.3 Purpose of sealing
- 1.4 Basic regarding speed and pressure
- 1.5 Basic seal requirements & Seal friction
- 1.6 Wear, seal life and Texture
- 1.7 Seal balance criterion – balance ratio, pressure distribution
- 1.8 Seal applications
- 1.9 Operating capabilities, advantages and limitations

• 02 DAY TWO

Module (02) Seal Design and Classification

- 2.1 Identify seal components and their function
- 2.2 Primary sealing components – seal head, seal seat, springs for space loading, metal bellows
- 2.3 Secondary sealing components – elastomeric O-rings, V-rings, U-cup rings, wedge rings
- 2.4 Inside and outside seals

- 2.5 General arrangement modes
- 2.6 Single: cartridge, component, split, stationary
- 2.7 Duplex: tandem back to back
- 2.8 Static and dynamic seals
- 2.9 Rotating and stationary seal heads
- 2.10 Sealing face conditions
- 2.11 Seal pre-loading

Module (03) Special Seal Types

- 3.1 Bellows
- 3.2 Bushing, labyrinth, diaphragm
- 3.3 Gas, motion, slurry
- 3.4 Carbon seals
- 3.5 Liquid ring and liquid barrier seals
- 3.6 Inflatable, ferrofluidic
- 3.7 Positive action type
- 3.8 Self-adhesive compression seals

• 03 DAY THREE

Module (04) Materials of Seal Construction

- 4.1 General considerations
- 4.2 Properties of elastomers
- 4.3 Plastic polymers
- 4.4 Cemented carbides
- 4.5 Miscellaneous sealing materials
- 4.6 Material compatibility

Module (05) Seals for Specific/ Special Applications

- 5.1 Hydraulic & Pneumatic
- 5.2 High temperature
- 5.3 Large diameter

• 04 DAY FOUR

Module (06) Environmental Considerations and Control

- 6.1 Abrasives, heat, dry operation
- 6.2 Flushing, recirculation, quenching
- 6.3 Convection, cooling and jacketing
- 6.4 Buffer and barrier fluid
- 6.5 Dead end lubrication, grease packing, circulating face lubrication

- 6.6 API 610 environmental control schemes

Module (07) Auxiliary Equipment

- 7.1 Cyclone separators
- 7.2 Pressurization units
- 7.3 Air-coolers and heat exchangers
- 7.4 Rotameters and flow controllers
- 7.5 Leakage detectors
- 7.6 Filters and strainers

Module (08) Seal Handling and Installation

- 8.1 General considerations
- 8.2 Seat squareness

Module (09) Seal Failures

- 9.1 Factors influencing seal life
- 9.2 Factors affecting seal performance
- 9.3 Seal malfunction and probable causes
- 9.4 Friction and wear
- 9.5 Adhesion, abrasion
- 9.6 Corrosion and surface fatigue

• 05 DAY FIVE

Module (10) Troubleshooting Failed Seals

- 10.1 At the pumping site
- 10.2 At the equipment tear down
- 10.3 Discoloration, chipping, cracking, rubbing, elastomer swelling, sickness, hardness

Module (11) Maximize Mechanical Seal Life

- 11.1 Preparing the pump – mechanically, hydraulically
- 11.2 Controlling temperature in the stuffing box
- 11.3 Controlling pressure in the stuffing box
- 11.4 What seal to choose? What face combination and elastomeric?

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 26, 2025	May 30, 2025	5 days	4950.00 \$	England - London
Aug. 24, 2025	Aug. 28, 2025	5 days	4250.00 \$	Bahrain - Manama
Dec. 8, 2025	Dec. 12, 2025	5 days	4250.00 \$	UAE - Dubai