MECHANICAL SEALS & DRY SEALS

TRAINIT ACADEMY

MUE106
Mechanical & Utility Engineering

COURSE TITLE

MECHANICAL SEALS & DRY SEALS

COURSE DATE/VENUE

29 April – 03 May 2019

London, UK

COURSE REFERENCE

MUE106

COURSE DURATION

05 Days

DISCIPLINE

Mechanical & Utility Engineering

COURSE INTRODUCTION

- The course, participants will gain a strong technical and practical understanding of mechanical seals and dry seal through the exploration of design features and implications of many sealing systems in today's application.
- This course is designed to provide an understanding how dry gas seals operate and the practical experience necessary to correctly remove and replace a dry gas seal in a centrifugal compressor
- Then we will examine the support systems that provide the different gasses used in the seals and monitor the health of the seals in open

COURSE OBJECTIVE

At the end of this course participants will be able to:

- Demonstrate a sound understanding of the fundamentals of seal selection
- Understand environmental considerations related to seals
- Troubleshoot seals

- Maximize mechanical seal life
- Classify various seals, including special seal types (dry gas seals)
- Explain considerations related to the materials used in seal construct
- Dry seal description , application
- how to maintenance and operate dry seal

Upon completion of this course you will be able to describe the purpose of a Mechanical

- Seal, identify the parts of a Mechanical Seal, describe Mechanical Seal classifications,
- describe Mechanical Seal materials of construction, describe Mechanical Seal operation,
- identify Mechanical Seal environmental controls, describe Mechanical Seal design
- history, and troubleshoot some basic Mechanical Seal failures.

COURSE AUDIENCE

- Mechanical Engineers, Superintendents, Supervisors, Foremen & Technicians
- Design Engineers, Senior Design Draftsmen, Draftsmen.
- Hydraulics Engineers, Superintendents, Supervisors, Foremen & Technicians
- Machinery Engineers, Superintendents, Supervisors, Foremen & Technicians
- Plant Engineers, Superintendents, Supervisors, Foremen & Technicians
- Maintenance Engineers, Superintendents, Supervisors, Foremen & Technicians
- Materials Engineers, Superintendents, Supervisors, Foremen & Technicians

COURSE CONTENT

Day 1

- Sealing introduction
- Sealing classification

- Importance of seal in industrial
- Stuffing box and Gland Packing

Mechanical Seal Parts

o The Mechanical Seal Purpose
- The Packed Stuffing Box
- The Purpose of a Mechanical Seal

o The Sections of a Mechanical Seal
- Mechanical Seal Construction
- The Primary Seal Rings
- The Secondary Seals
- The Metal Parts

o Primary Seal Rings
- The Primary Seal Rings
- Seal Face Flatness
- Flatness Defined
- What is a Helium Light Band?
- What is an Optical Flat?
- Reading Light Bands
- Flatness Readings - Rules of Thumb
- Seal Face Lubrication
- The Asperity Theory
- The Pressure Drop Theory
- The Pressure Wedge Theory
- The Dry Running Theory
- The Three Band Theory
- Secondary Seals

The Gland Seal

- The Shaft Seal
- O-ring Seals
- V-ring Seals
- U-cup Seals
- Wedge Seals
- Boot Type Seals
- Additional Secondary Seals
- Mechanical Seal Hardware
- The Gland
- The Spring Mechanism
- Large Single Coil Springs
- Multiple Small Springs
- Metal Bellows

- Some Common Problems with Metal

Bellows Seals

- Finger Springs
- Rubber Bellows
- Some Common Problems with Rubber

Bellows Seals

- The Shaft Sleeve
- The Drive Mechanism

Day 2

Mechanical Seals

- Operating Principles and Fundamentals, Seal Design, Nomenclature
- Seal Balance
- Mechanical Seal Configurations, Double Mechanical Seals
- Fluid Characteristics and Seal Applications
- Auxiliary Mechanical Seal Systems, Flush Fluid, Temperature Control, Cleaning Devices, Barrier Fluid Systems.
- Materials of Construction.
- Mechanical Seal Troubleshooting, Failure Modes and Failure Analysis, Bellows Symptoms.
- The Effect of Vibrations on Mechanical Seal Performance, Sources of Vibrations
- Mechanical Seal Arrangements
- Mechanical Seal Selection
- Installation and Reliable Seal Operation
- Safety Features, Seal-less Pumps
- Seals Vs Packing

Day 3

Mechanical Seal Materials

- Seal Ring Parts
- Elastomer Parts
- Metal Parts

Balancing:

- Balancing requirements Inside and Out

- Inside Seal Balancing
- Outside Seal Balancing
- Double Seals
- Lip Seals

Flushing & Cooling system

- Sealing Liquid
- Flushing and Flow rates
- Circulating Ring Seal for Seal Cooling
- Thermal Aspects of mechanical seals

Day 4

Application and troubleshooting

- **Application**
  - Pump
  - Compressor
  - Steam turbine
  - Gas turbine
  - Fans
- **Mechanical Seal Troubleshooting**
  - Mechanical Seal - Wear Track Symptoms
  - Mechanical Seal - Seal Face Symptoms
  - Mechanical Seal - Elastomer Symptoms
  - Mechanical Seal - Parts Inspection
  - Mechanical Seal - Bellows Symptoms

Day 5

Dry seal

- Seal Design & Operating Principles
- Control & Monitoring System
- Seal Operation
- Seal Transportation and Storage
- Seal Refurbishment
- Seal Installation, Operation & Maintenance Manual (IOM)
- Fitting Procedures
- Commissioning

COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

$6,150 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions