T-012 OPERATION AND MAINTENANCE OF CENTRIFUGAL AND RECIPROCATING COMPRESSORS

A practical guide to compressors maintenance and operation that includes highlights on key design aspects and how they influence operation and maintenance practices

Compressors lie at the heart of many oil & gas plants and their reliable operation is key to ensure uninterrupted production. Compressors are complex pieces of equipment and insufficient understanding of their engineering fundamentals by maintenance and operations personnel is often the main source of unplanned downtime.

This course provides a comprehensive and in-depth overview of the best-practices in operation and maintenance of centrifugal and reciprocating compressors and their components, including highlights on engineering fundamentals, mechanical and thermodynamic design aspects, safety, safeguarding, condition monitoring, and control aspects to enable a full understanding of the operation and maintenance practices. Numerous exercises and discussions enable the participants to learn how to translate the concepts learned into action.

The course collects the best-practices accrued in maintenance and operation of compressors in upstream, downstream, and LNG plants around the world by the course creators throughout their 30+ years career in Shell

Who should Attend?

The course is suitable for the following:

- Process & Operations Engineers and Supervisors
- Maintenance Engineers and Supervisors
- Reliability engineers, technical managers of LNG plants or refineries

Duration

4 days

Course structure and content

Chapter 1 : Introduction
 Safety Induction
 Course Program
 Compressors overview

Chapter 2: General issues
 Installation
 Alignment
 Start-up and testing

Chapter 3: Fracture and Fatigue

Classification of failures
Brittle fractures
Stress-corrosion cracking
Ductile fractures
Fatigue failures

Chapter 4: Bearings
 Hydrodynamic bearings:
  Bearing materials
  Failure mechanisms

Service problems

Anti-friction bearings:
- Manufacturing and installation
- Failure mechanisms
- Inadequate lubrication
- Electrical discharge
- Failure mode identification

Chapter 5: Metal Loss Mechanisms
- Erosion
- Cavitation
- Corrosion
- Wear

Chapter 6: General Issues
- Condition and performance monitoring
- Rotordynamics
- Rotor balancing
- Syndicate exercise

Chapter 7: Centrifugal Compressors
- Overhaul philosophy
- Syndicate exercise
- Compressor performance curve
- Compressor capacity control
- Anti-surge protection
- Compressor installation
- Start-up and testing
- Oil systems
- Case history
- Effects of fouling

Chapter 8: Reciprocating compressors

Introduction to compressor types
Overhaul Philosophy
Suction & Discharge Valves
Fixtures
Alignment
Pistons & Rings
Piston Rods and packings
Capacity control
Gas quality
Condition monitoring
Case studies
Compressor conversions
Syndicate Exercise
Problems workshop

Chapter 9: Gearboxes
- Overview of types
- Overhaul practices
- Lubrication
- Start-up & testing
- Variable-speed

Chapter 10: Electric Motors
- Construction
- Maintenance
- Bearings, lubrication

Chapter 11: Case Histories
- Compressor change-out
- Recip. Compressors bearings
- Equipment selection exercises & problems discussion

Training Outcome:

On completion of the course, you should be able to:

- Understand the best-practices in compressor maintenance and operation
- Understand the basic engineering principles from which maintenance and operation practices originate
- Know how to apply the newly learned concepts in your everyday work

Course Presenters

Nico Henrard: with a career of over 30 years with Shell, Nico has worked as rotating equipment engineer in refineries, LNG, upstream plants, and large Shell projects. In the later part of his career Principal Rotating Equipment in Shell Global Solutions, providing consultancy and advice to all Shell Operating Units and Projects around the world.