GAS COMPRESSION FOUNDATIONS PRD044

COURSE DESCRIPTION

Gas compressors are used in power and gas fields in many applications such as gas boosting, gas lift, gas re-injection and vapour recovery systems. Gas compression projects often encompass many engineering disciplines and different technologies. This course presents an overview of gas compression technologies and foundations. It provides participants with an underpinning knowledge of gas compression foundations using a variety of rich multimedia techniques. It examines the different types of gas compressors in use, gas compression systems, gas compression foundations, and the use of reciprocating and centrifugal compressors.

COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary to understand different types of gas compressors in use, gas compression systems, gas compression foundations, and the use of reciprocating and centrifugal compressors.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Explain why gas is compressed.
- Identify the different types of compressors.
- Explain how gas is compressed in a reciprocating compressor.
- Explain how pulsation is removed.
- Explain how gas is compressed in a centrifugal compressor.
- Identify the influences that determine the type of compressor to be used.
- Identify the various components of a typical gas compression system.
- Identify the LP, MP and HP Compression Systems.
- Identify gas Compression Foundations.
- Explain the basic Gas Export System.
- Explain how and why the gas is supplied to the Gas Lift System.
- Explain the basic Fuel Gas System.
- Identify the components of a Single Stage Reciprocating Compressor.
- Identify the principles of operation of a Double Acting Compressor.
- Explain the purpose of Multistage Compressors.
- Describe the forces acting on the compressor.
- Identify the types of compression.

- Explain how the efficiency of a Reciprocating Compressor is determined.
- Explain capacity control and unloading devices.
- Explain the different methods of control.
- Explain the principles of cooling and lubrication.
- Identify a Frame Type Compressor.
- Identify the difference between fans, blowers and compressors.
- Identify the components of a Centrifugal Compressor.
- Identify the types and reasons for different casing designs.
- Describe the components of a Centrifugal Compressor.
- Explain the purpose of different types of seals and their functions, the seal oil system, the Purge System, and the Lubricating Oil System.
- Explain the purpose of Coalesces and Knock-Out Vessels.
- Describe surge and its causes and effects.
- Outline the prevention and control of surge.
- Outline Stonewalling.
- Outline capacity control.
- Describe the function of inlet guide valves.
- Describe centrifugal start up.
- Describe purging.
- Describe draining.
- Describe auxiliary system start up.
- Describe compressor shutdown.
- Identify innovative compressor improvements.
- Explain the purpose of Wet Gas Compressors.
- Describe Inline Gas Compressors.
- Explain the principle of Ramjet compressors.

WHO SHOULD ATTEND

- Facilities Engineers
- Production Engineers
- Operations Engineers & Supervisors
- Maintenance Engineers
- Project Engineers / Managers

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Overview of Oil and Gas Processing Facilities
    - Typical well fluid composition.
    - Export gas specifications.
    - Near-well surface production facility and the gas plant.
    - Process flow diagram.
    - Process stream that undergo compression.
2. Overview of Gas Compression
    - Field gas compression.
    - Inlet gas compression prior to treating.
    - Outlet gas compression prior to export pipeline.
    - Compression for gas lift.
    - Compression for gas gathering.
    - Compression for condensate recovery.
    - Compression for transmission and distribution.
    - Compression for gas re-injection / pressure maintenance.
3. Gas Compression Foundations
    - Type of Compressors and selections
        - Positive-displacement or intermittent flow unit.
        - Reciprocating compressors.
        - Rotary positive-displacement compressors.
        - Centrifugal compressors.
        - Axial compressors.
        - Mixed-flow compressors.
        - Comparison between compressors.
        - Compressors selection.
    - Thermodynamics of Gas Compression
        - Isothermal, isentropic and polytropic ideal compression processes.
        - Real gas behavior and equations of state.
        - Compression ratio.
        - Compression design.
        - Determination of the number of stages
        - Inlet flow rate.
        - Compression power calculation.

- Compressor Control and Performance Maps
  - Reciprocating compressors.
  - Centrifugal compressors.
- Performance Calculations for Reciprocating Compressors
  - Pulsation control for reciprocating compressors.
  - Determination of compression horsepower.
  - Generalized compressibility factor.
  - Nomograph for diagnosing compressors cylinder.
- Performance Calculations for Centrifugal Compressors
  - Nomograph for estimating compressor performance.
  - Estimation of HP required for compressing natural gas.
  - Estimation of compressor HP for discharge pressure 1000 psi.
  - Calculation of BHP required for compressing gas.
  - Sizing a fuel gas line for a compressor station.
  - Estimation of engine cooling water requirements.
  - Estimation of fuel requirements for internal combustion engines.
  - Estimation of fuel requirements for compressor installation.
  - Performance testing guidelines for centrifugal compressors.

4. Safety and Environmental Considerations
   - High pressure hazard.
   - Noise hazard.
   - Exhaust emissions from compressor power drivers.
   - CO emission from gas turbine.
   - Production of NOx.

5. Gas Compression Foundation Case Studies