

## Who Should Attend?

Mechanical, facilities, plant or pipeline engineers and piping system designers who are involved in the design of in-plant piping systems for oil and gas facilities.

## The Participant Will Learn:

- Selecting the appropriate integrated pump and compressors units (drivers, pumps, compressors, and auxiliary systems).
- Integrating the pump or compressor units with the upstream and downstream piping and process equipment.
- Evaluating pump and compressor units and their drivers in multiple train configurations – parallel and series.
- Identifying the key local and remote control elements of pumps and compressors as well as their drivers.
- Defining the major life-cycle events such as changes in flows, changes in fluid composition, and changes in operating conditions that can affect equipment selection and operating strategies.
- Assessing the key pump hydraulics and compressor thermodynamics and their affect on selection and operations.
- Identifying significant conditioning-monitoring parameters and troubleshooting techniques.

## Overview of Pump and Compressor Systems (ME-44)

### Course Outline

Daily schedule is approximate.

<b>DAY 1</b>	<ul style="list-style-type: none"> <li>• Overview of Pumps                             <ul style="list-style-type: none"> <li>- Types- Kinetic and Positive Displacement</li> <li>- Pump Applications</li> <li>- Codes and Standards</li> </ul> </li> <li>• Centrifugal Pump Components                             <ul style="list-style-type: none"> <li>- Rotor-Impellers and Shaft</li> <li>- Mechanical Seals</li> <li>- Bearings</li> </ul> </li> <li>• Centrifugal Pump Hydraulics                             <ul style="list-style-type: none"> <li>- System Head</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Pump Performance</li> <li>- Affinity Laws</li> <li>• Centrifugal Pump Controls                             <ul style="list-style-type: none"> <li>- Process Variable</li> <li>- Control Methods</li> </ul> </li> <li>• Overview of Drivers                             <ul style="list-style-type: none"> <li>- Electric Motors</li> <li>- Natural Gas Engines</li> <li>- Gas Turbines</li> </ul> </li> </ul>
<b>DAY 2</b>	<ul style="list-style-type: none"> <li>• Positive Displacement Pump Overview                             <ul style="list-style-type: none"> <li>- Applications</li> <li>- Codes and Standards</li> </ul> </li> <li>• Reciprocating Pump Components                             <ul style="list-style-type: none"> <li>- Valves</li> <li>- Packing</li> <li>- Plungers</li> </ul> </li> <li>• Reciprocating Pump Hydraulics and Control                             <ul style="list-style-type: none"> <li>- Performance</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- NPSHA</li> <li>- Pulsations</li> <li>• Rotary Pump Types</li> <li>• Rotary Pump Components-Gears, Screws, Lobes</li> <li>• Rotary Pump Hydraulics and Control                             <ul style="list-style-type: none"> <li>- Performance Curves</li> <li>- Power</li> <li>- Control Methods</li> </ul> </li> </ul>
<b>DAY 3</b>	<ul style="list-style-type: none"> <li>• Introduction to Compressors                             <ul style="list-style-type: none"> <li>- Applications</li> <li>- Useful Equations</li> <li>- Selection</li> </ul> </li> <li>• Centrifugal Compressor Components                             <ul style="list-style-type: none"> <li>- Types</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Impellers</li> <li>• Centrifugal Compressor Performance                             <ul style="list-style-type: none"> <li>- Curves</li> <li>- Choke/Stonewall</li> <li>- Surge</li> </ul> </li> </ul>
<b>DAY 4</b>	<ul style="list-style-type: none"> <li>• Centrifugal Compressor Controls                             <ul style="list-style-type: none"> <li>- System Curve</li> <li>- Recycle</li> <li>- Vanes-Inlet Guide Vanes &amp; Diffuser</li> <li>- Variable Speed Drives</li> </ul> </li> <li>• Reciprocating Compressor Components                             <ul style="list-style-type: none"> <li>- Frame End</li> <li>- Cylinder End</li> <li>- Lubrication System</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Reciprocating Compressor Performance                             <ul style="list-style-type: none"> <li>- Compressor Cycle</li> <li>- Volumetric Efficiency</li> <li>- Pulsation</li> </ul> </li> <li>• Reciprocating Compressor Controls                             <ul style="list-style-type: none"> <li>- Speed Control</li> <li>- Recycle</li> <li>- Valve Unloaders</li> <li>- Clearance Pockets</li> </ul> </li> </ul>
<b>DAY 5</b>	<ul style="list-style-type: none"> <li>• Introduction to Rotary Screw Compressors                             <ul style="list-style-type: none"> <li>- Operation</li> <li>- Types</li> </ul> </li> <li>• Rotary Screw Compressor Performance                             <ul style="list-style-type: none"> <li>- Compressor Cycle</li> <li>- Volume ratio</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Efficiency</li> <li>• Controls                             <ul style="list-style-type: none"> <li>- Speed Control</li> <li>- Recycle</li> <li>- Valves-Slide, Poppet and Turn</li> </ul> </li> </ul>

## About the Course:

This is an intensive 5-day course providing a comprehensive overview of pumps and compressor systems. The focus is on equipment selection – type, unit and station configuration, integration of these units in the process scheme and control strategy in upstream and midstream oil and gas facilities. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.