Best Technology Soultions **(BTS)**

Training Program

# Pumps & Compressors: Selection, Operation & Maintenance

**Training Program**

## Introduction:

Pumps and compressors are essential components in almost all industries in that they are required to meet system demands and operate reliably. Further, since they can consume approximately 30% of a plant's total energy use, efficient operation is essential. Pumps and compressors therefore need to be cost efficient and reliable. This course provides understanding of the operation and maintenance of various types of rotary and reciprocating pumps and compressors.

By attending this course you will gain an understanding of the characteristics of various types of pumps and compressors and their components. The course will provide engineers and technicians with information for the optimal selection, operation and maintenance of centrifugal and positive displacement pumps as well as positive displacement and dynamic compressors.

## Who Should Attend?

Mechanical Engineers, Mechanical Supervisors, Mechanical Foremen & Technicians, Process Engineers, Facilities & Plant Engineer, Technicians and operators who desire a general knowledge of pumps in oil and gas facilities, Maintenance & Production Engineers , Supervisors & Industry Personnel

## Course Objectives:

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

- Gain an awareness of the performance characteristics of the various types of pumps and compressors
- Increase the reliability of your pumps and compressors
- Develop an effective maintenance program with the components of pumps and compressors
- Improve performance of your pumps and compressors with the increased appreciation of the influence of
- fluid flow and associated equipment
- Optimize the operation and maintenance of different types of pumps
- Carry out failure analyses on pumps thereby avoiding repetitive failures
- Know how to select, size, and specify common oil & gas pump and compressor equipment
- Be able to troubleshoot pump problems
- Have an understanding of the different types of pumps

## Course Outline:

**Introduction**

- What constitutes a good
- pump/compressor or compressor
- Safety
- Reliability
- Efficiency
- Risk consideration
- Life cycle cost consideration
- Overview of Statutory requirements

**Basic Theory of Liquid Flow**

- Pressure
- Flow
- Bernoulli's equation
- Properties of fluids
- Flow characteristics

**Pump Regulations, Codes and Standards**

- General
- API Pump Codes

**Positive Displacement Pumps**

- Reciprocating
- Diaphragm
- Rotary
- Flow control

**Centrifugal Pumps**

- Components
- Cavitation
- Net positive suction head
- Pump curves
- Pump efficiency
- Best efficiency point
- Impeller Speed
- Affinity laws
- Multi-pump systems

- Flow control

**Pump Selection Considerations**

- Positive displacement versus centrifugal pumps
- Pump selection
- Procurement
- Life cycle costing

**Basic Theory of Compressed Gasses**

- Compression cycle
- Standard terms
- Effect of elevation and temperature

**Types of Compressors**

- Positive Displacement
- Dynamic
- Compressor control

**Centrifugal Compressors**

- Introduction
- Principle of operation
- Operation
- Parts of Centrifugal compressors
- Casing configurations
- Types of compressors
- Performance of centrifugal compressor
- Polytropic compressor
- Characteristic curves

- Compressor Controls

**Associated Compressor Equipment**

- Filters
- Intercoolers and aftercoolers
- Dryers
- Air receivers

**Compressed Air Systems**

**Air Compressor Selection Considerations**

**Pump and Compressor Drives**

- Motors
- Variable speed drives
- Motor couplings
- Belt drives

**Common Pump and Compressor Components**

- Seals
- Lubrication
- Bearings
- Valves

**Operation of Pumps and Compressors**

- Pump operation
- Compressor operation
- Safety

**Maintenance of Pumps and Compressors**

- General maintenance considerations
- Maintenance techniques
- Maintenance practices
- Routine maintenance