API Standard 617

Axial and Centrifugal Compressors and Expander Compressors

About the Course:

Compressors are essential elements in practically all sectors because they must match system needs and work consistently. Industrial compressors are the fourth utility (after electricity, water, and gas), offering a clean, dependable, and safe power source for a variety of applications. Compressed air systems operate in tough settings, delivering dependability and longevity in several applications. They are widely used in petrochemical process plants, air systems, cooling and heating systems, and a variety of other applications. Understanding how to operate the compressors appropriately, as well as knowing the proper maintenance and troubleshooting techniques.

The course aims to teach you more about compressors, including their design, operation, performance curves, testing, control, maintenance, and troubleshooting. Requirements for related codes and standards will also be discussed.

Furthermore, because they might account for about (30-40%) of a plant's overall energy consumption, efficient operation is critical. Compressors must consequently be both economical and dependable.

Note: During the course, participants are encouraged to participate in discussions, make remarks, and bring up their own issues.

Course Objectives:

Upon successful completion of this course, the participants will be able to:

1) Enumerate the different types of compressors and the range of their applications.

2) Describe the operation of centrifugal and axial compressors including compressor design aspects, laws, performance comparisons, characteristic curves and performance testing, according to API Standard 617.
3) Apply the various methods of compressor alignments such as visual, straight edge and feeler gauge, rim and face, reverse dial indication, cross dialing and laser alignment.
4) Diagnose soft foot conditions, and apply measurement and correction techniques.
5) Monitor vibration levels and their measurements.
6) Understand the principles of condition-based monitoring.
7) Provide inspection check sheets, and confirm that they are normally attached to the equipment QC Procedures.

Organizational Impact

Proper operation, inspection and maintenance of all compressors in the plant with appropriate specification would result in significant measurable improvements in process plant systems including improved plant integrity, reliability and availability with fewer failures that leading to:

- Improved plant integrity.
- Improved equipment reliability.
- Improved equipment availability.
- Better safety record.
- Improved plant profitability.

Improved plant integration and operation

Who Should Attend?

This training course will greatly benefit:

1) Operation, technical service and maintenance professionals.
2) Technical professionals responsible for maintenance and repair of equipment.
3) Professionals involved in inspection and maintenance and repair.
4) Technical professionals dealing with risk assessment and integrity analysis.
5) Technicians dealing with regulating and metering and other measurements.

Training Methodology

This training course will consist of lectures and interactive worked examples presented in a series of workshops. A variety of interesting and instructional videos will also be presented. This training course will focus on explaining all technical elements and providing solutions to difficulties encountered in ordinary industrial practice relating to rotating equipment operation and maintenance, as well as repair and changes.

Every learning topic will be reinforced with actual examples. There will be several opportunities for active conversation, sharing of professional experiences, and interchange, which will assist to reinforce the acquired knowledge. The training materials will be provided.

Course Outline:

Plant operations, maintenance personnel, plant engineering managers, and supervisors in the petrochemical, power, chemical, and other industries will find this course valuable. This course will be very helpful in increasing the understanding and confidence of those who have not previously had formal training in compressor operation and maintenance. Individuals who have already completed compressor training might get new information and benefit from a refresher.

DAY 1:

Compressors Working Principles, Types, Operational Aspects, Selection and Specification Criteria

- Gas Laws and Theory of Operation.
- Compressor Operation.
- Overview of the Main Features of Various Types of Compressors.
- Operational Principles and Constructional Feathers.
- Performance Characteristics Curve.

DAY 2:

Compressors Operational Aspects, Selection and Specification Criteria

- Characteristics of Centrifugal and Axial Flow Compressor.
- Main Components and its Function.
- Analysis and Performance Characteristics of Centrifugal Compressor Efficiency.
- Surging, Choking, Bleed Valves, Variable Stator Vanes, Inlet Guide Vanes.
- Minimum and Maximum Flow Constraints.
- Surge Control.
- Compressor Selection and Specification Criteria for Drive Rating Selection.
- Performance Testing.
- Standards and Acceptance Criteria for Performance Testing.

DAY 3:

Compressors Selection, Operation, Troubleshooting and Vibration Control

- Essential Criteria for Selecting the Compressor.
- Compressor Capacity: Loadings and Speeds.
- Compressor Safety Control Noise Control and Protection.
- Guidelines for Compressor Installation, Construction and Operation.
- Compressor Inspection, Maintenance, Control, Performance Testing, and Troubleshooting.
- Starting and Shut-down.
- Vibration Level and their Measurements.
- Bearing Housing Temperatures.
- Accessories (Shaft seal, Bearing).

DAY 4:

Troubleshooting (Symptoms, Causes and Remedial Measures)

- Evaluate and interpret performance and integrity data of compressors.
- Recognize and respond to abnormal conditions and take appropriate corrective action.
- Troubleshooting and Failure Modes.
- Guidelines for Trouble-free Centrifugal Compressor Operation.
- How to Prevent Surge and Stonewall in Compressors.
- Effects of Speed and Gas Composition.
- Shaft Alignment.
- How to Correct Misalignment.
- Soft Foot Definition.
- Effects of Soft Foot, Measuring Soft Foot and Correcting Soft Foot.

DAY 5:

Preventive and Predictive Maintenance and Energy Saving Opportunities

- Maintenance by Plan Vs. Maintenance by Default.
- Equipment Reliability and Availability.
- Building and Maintenance Management Plan.
- Energy Saving Opportunities for all types of Compressors.