



Compressor Types And Operations

Training Program



Introduction:

Upon completion of this course, participants will have gained a thorough understanding of the various centrifugal (i.e. turbo) and reciprocating compressor configurations available to virtually every industrial user. Items discussed include mechanical design features, sizing and application criteria, maintainability, reliability, vulnerability and troubleshooting issues. Participants will:

- Learn simple techniques and short-cut methods of machinery selection, which can take the place of tedious hand calculations and will serve as rapid means to determine sensitivity or influence of parameter changes on equipment performance.
- Be able to determine the most appropriate and efficient matching of compressor to driver.
- Also acquire knowledge of operating and maintenance issues by getting to know mechanical design, machinery components, piping design, as well as proven approaches to monitoring, troubleshooting and maintenance of compressor installations.

Who Should Attend?

This application and equipment course is intended to be of direct use by persons in staff positions (e.g., Senior Technicians, Operators, Supervisors, Superintendents) and corporate engineering, plant planning and design, systems design, equipment selection and evaluation, and equipment maintenance areas. It will be of value to equipment and systems specialists in engineering contractor firms. This course should also be valuable to managerial and supervisory individuals responsible for operations and maintenance functions. The industries most directly involved with the subject matter are those producing chemicals, petrochemicals, petroleum products, natural gases, manufacturing gases, steel and other metals, and plants requiring process refrigeration.

Methodology:

This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include:

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions

Certificate:

BTS attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration.

Course objectives:

Centrifugal and Reciprocating Compressors of several types, which have widely varying configurations and applications, are used extensively in the process industries. These compressors represent a significant part of the capital and operating costs of most plants, so that optimizing their selection is of major economic importance. The course is devoted to design features, efficiencies, operating characteristics, reliability and maintenance implications of centrifugal compressors.

This course will cover the operating principles of centrifugal compressors, specifications, their design, thermodynamics, effects of efficiency on operating costs, energy usage, effect on plant costs, special materials of construction, selection, troubleshooting and maintenance.

The course will also cover plant run-length extension surveys, organizing for successful turnarounds and ongoing reliability improvement, and preventive vs. predictive maintenance strategy decisions.

The course will provide the participant with a basic, as well as advanced, centrifugal and reciprocating compressor technology inventory required to successfully select, apply, troubleshoot and maintain compression equipment. Throughout the course, participants will have ample opportunity to have equipment-related questions answered by the Course Director.

Course outline:

Module 1

- Introduction to Compressor Types
 - ✓ Centrifugal, Axial, Reciprocating, Helical Screw, Ranges of Application and Limitations
- Mechanical Design of Centrifugal Compressors
 - ✓ Compressor Side Streams, Rotors, Balancing, Rotor Dynamics, Impellers, Casings, Bearings, Seals, Couplings, Controls

Module 2

- Design and Materials of Reciprocating Compressor Components
 - ✓ Design and Materials, Design of Non-Lubricated Compressors, Piston Rod and Frame Loading, Distributing Forces and Balancing
- Basic Compressor Parameters
 - ✓ Thermodynamics, Capacity, Power, Efficiencies, Gas Properties, Intercooling
- Selection of Centrifugal and Reciprocating Process Compressors
 - ✓ Calculation Methods, Characteristic Curves, Stability

- Turbo-Compressor Train Operation. Inspection, Maintenance, Overhaul and Repair - IMO&R
 - ✓ IMO&R Planning, Execution, Documentation, Troubleshooting

Module 3

- Operation and Maintenance of Reciprocating Compressors
- Lubrication and Lubrication Systems, Valves, Valve Problems and Rebuilding, Packing and Packing Problems, Non-Lubricated Compressors, Controls and Cooling Systems
- Overhaul and Repair of Reciprocating Compressors
- Methods of Repair and Overhaul, Alignment and Piston Rod Run-out, Foundation Problems and Repair, Component Repair and Rebuild
- Predictive vs. Preventative Maintenance (PdM vs. PM) Technique - Reciprocating Compressors
- Types of Maintenance Programs, Purpose of PM, Inspection and Inspection Forms, Vendor and Contractor Requirements, Planning and Implementation.

Module 4

- Basic Approaches to Machinery Troubleshooting
- Troubleshooting Compressor Problems: Typical Problems and Solutions Diagnostic Tests, Compressed Air System Evaluations
- Safety in Compressor Operation and Maintenance
- Basic Safety Rules, Safety Devices and Shutdowns, Safety Maintenance Procedures
- Machinery Reliability Audits and Reviews
- Overview, Reliability Impact on Plants