



THE CHEMICAL ENGINEERING MAJOR

Process Plant Troubleshooting & Engineering Problem Solving

Website: www.btsconsultant.com

Email: info@btsconsultant.com

Telephone: 00971-2-6446633

Process Plant Troubleshooting & Engineering Problem Solving

Introduction:

Modern industrial processes are large, complex and have a high degree of interaction between both dependent and independent variables. This makes problem solving difficult and leads to the “disappearing problem” syndrome. Problems often disappear without being solved only to reappear again. This seminar deals with a unique approach of combining cause and effect problem solving thinking with formulation of theoretically correct working hypotheses to provide rapid and effective problem solving techniques for the process industry.

Problem Solving in the process industry is often characterized by either inference based on cause and effect relationships or highly involved theoretical approaches. Neither of these approaches is satisfactory in a modern manufacturing environment. The cause/effect inference approach while being expedient often results in solutions that do not eliminate the problem, but in fact make the problem worse. The more sophisticated highly theoretical approach is rarely expedient enough to satisfy time constraints in a production facility. Thus one of the most frequent industry requests to the academic world is “give us people that can solve problems”.

This program presents an approach that emphasizes the classical problem solving approach (defining the sequence of events) with the addition of the steps of formulating a theoretically correct working hypothesis, providing a means to test the hypothesis, and providing a foolproof means to eliminate the problem. The initial part of the seminar focuses on defining the problem that must be solved and obtaining the location, time and quantity based specifications of the problem. The initial part of the seminar is suitable for all engineering disciplines as well as non-engineers.

The second part of the seminar deals with the utilization of chemical engineering fundamentals to develop a technically correct working hypothesis that is the key to successful problem solving. The primary emphasis is on pragmatic calculation techniques that are theoretically correct. These techniques have been developed by the Seminar Instructor in 40+ years of industrial experience. Using these techniques, theoretically correct working hypotheses can be developed in an expedient fashion.

Course Objectives:

The objective of this training program of 5 days duration is to impart Training on Trouble Shooting Chemical Plant Problems related to the petroleum / petrochemical / fertilizer and power generation plants. The training covers the basics of common chemical plant equipment such as Pumps, Compressors, Turbines, Heat exchangers, coolers, Distillation columns, static vessels, pipe lines, motors etc and troubleshooting various problems associated with them.

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

- Apply and gain an in-depth knowledge on process plant troubleshooting and engineering problems solving through various practical exercises carry out during the course
- Enumerate the components of plant problem solving as well as the various troubleshooting techniques on engineering problem solving by familiarizing the potential sources
- Specify the limitations to plant problem solving through sources of historical data and become aware of the daily monitoring system guidelines by setting trigger points
- Apply the methods of risk analysis particularly HAZOP and MSDC in process plant troubleshooting and practice the process of engineering problem solving through sample problems in troubleshooting
- Discuss the scope of applied economics including other valuation forms & methods, and review the guidelines for problem solving temperature, pressure, and level
- Employ the simplified approach in solving compressor problems and know distillation, plates & tray stability and discuss clearly the elements of measurements & verifications, and carry-out sample exercise on kinetics, flow, mechanical and designs

- Recognize the attributes of equivalent piping lengths, commercial correlations, and fluids by means of practical exercises
- Discuss the importance of two phase flow including its attributes and applications and analyze the characteristics of controllers, feedback, feed forward and cascade controls used in process control
- Improve knowledge on process control and optimization, process analyzers, distillation multiple control, volume control, condenser control, and control project drawback
- Develop an understanding on heat transfer and various troubleshooting techniques and applications in used process plant
- Implement several strategies on distillation column packing and identify the different forms of hazards to equip participants with the QRA procedures and demonstration
- Carry out the latest methodology of MSDS and discuss if the needed information is good enough or incomplete
- Identify various accidents in the process plant and know what a flintborough accident

Training Methodology

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures
- 30% Workshops & Work Presentations
- 20% Case Studies & Practical Exercises
- 20% Videos, Software & General Discussions
- The course instructor may modify the above training methodology before or during the course for technical reasons with no prior notice to participants.

Who Should Attend?

This training is designed for engineers and operations personnel of process plants, refineries (Oil and Gas) and power plants, involved in operation, maintenance and performance monitoring of Operation.

- Process engineers,
- Plant managers,
- Team leaders,
- Section heads,
- Plant supervisors and
- Technical staffs (Operators and Technicians).

Daily Agenda:

Concepts

- The nature of problems
- Context – Asset based or Business Process based
- Structured approaches – 6 Big Losses, 7 Wastes
- Techniques introduction
- Tools introduction

Tools & Techniques – Practical Experience

- Problem Analysis
- Practical Use of Tools and Techniques
- Case Studies
- Project selection methods
- Tools & Techniques – selecting the right one

People Issues

- Working practices – empowerment or impairment?
- Group dynamics
- Individual motivators
- Developing Troubleshooting and Problem Solving skills
- Managing change

Chemical Plant Equipment Trouble Shooting Fractionators Operation and Trouble Shooting

- Principles of Distillation (Fractionation)
- Reflux
- Reboiling
- Fractionators Operation and Trouble Shooting

Heat Exchanges Operation and Trouble Shooting

- Shell and Tube Exchangers
- Double pipe Exchangers
- Indirect Heaters
- Air Cooled Exchangers
- Heat Exchanger Operation and Trouble Shooting

Fired Heaters Operation and Trouble Shooting

- Performance Monitoring
- Fired Heater Operation and Trouble Shooting

Pumps Operation and Trouble Shooting

- Basic Pump Hydraulics
- Calculating Total Head
- Horsepower Calculations
- Net Positive Suction Head (NPSH)
- Pump Performance Curves
- System Performance
- Operation, Control and Trouble Shooting

Compressors Operation and Trouble Shooting

- The Theory of Compression
- Centrifugal Compressors Operation, Control and Trouble Shooting

- Reciprocating Compressors Operation, Control and Trouble Shooting
- Operation, Control and Trouble Shooting

Utilities Systems Operation and Trouble Shooting

Water Treatment Systems

- Introduction to Water Treatment
- Suspended Solids
- Dissolved Solids
- Dissolved Gases
- Industrial Water Treatment
- Primary Water Treatment
- Secondary Water Treatment
- Potable Water Purification
- Disinfections of Water
- Sterilization of Water by (Chlorine, Ozone, Chloramines)

Waste Water Systems

- Main Sources of Pollution
- At the Production
- During Transportation
- During Refining
- De – Oiling of Water
- Purpose of De – Oiling
- API Interceptor
- Parallel Plate Interceptor (PPI) and Corrugated Plate Interceptor (CPI)
- Flotation Units
- Flocculation Units

Fuel Systems

- Typical Fuel Gas System

- Typical Problems
- Pressure Variation
- Liquid in the Gas
- Change in Fuel Gas Composition

Air Systems

- Instrument Air
- Typical Instrument Air Supply Systems
- Instrument Air Distribution Systems Operation and Trouble Shooting
- Utility Air
- Typical Utility Air Supply Systems
- Utility Air Distribution Systems Operation and Trouble Shooting

Process Shutdowns (PSD) and Emergency Shutdown (ESD)

Normal Shutdown Procedures

Process Emergency Shutdown

- Process Failures
- Utility failure