Advanced Petroleum Refining Troubleshooting Training Course

Introduction

The success of every company depends on each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes, and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development are an investment in future success - give yourself and your employees the keys to success

It is strategically important that your team understands the fundamentals of process unit operations concepts. This is the difference between being in the best quartile of operational ability and being in the last quartile. There is vast difference in the operational ability of operating companies and most benchmarking studies have confirmed this gap in operational abilities.

The unit on stream time is an indication of operations training. A first quartile-operating unit's on steam factor is greater than 97%. If the on stream factor is below 97% a review of operation training and development is warranted. If on stream factor or average years of operating experience is declining a review of operations training and development should be considered.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts is greatly beneficial in closing the gap if you are not in the best quartile or maintaining a leadership position. Most studies show that a continuous reinforcement of best practices in operational principles is the most effective way to obtain the desired results. Training and learning should be an ongoing continuous lifelong goal.

Course Objective

This course will guide the participates to develop key concepts and techniques to operate and troubleshoot key refining fundamental unit operation systems. These key concepts can be utilized to make operating decisions that can improve your unit's performance.

Since day-to-day operation problem solving and optimizing are critical to the profitability of plant operations, troubleshooting is a prime responsibility of refinery and plant operations, maintenance, and engineering personnel. The importance of troubleshooting has grown as plants push to operate at higher and higher throughput levels. Lost profits due to unsolved unit problems can never be recovered.

Consistently maintaining smooth operation, maximum capacity, and acceptable product quality are important goals that can be difficult to achieve. Thus, this program has been developed to provide an in-depth, yet practical review of the art and science of plant troubleshooting.

The program's content is both comprehensive and wide-ranging. The sessions begin with a discussion of the fundamentals, including process objectives, equipment behavior, interaction of the process and equipment, and troubleshooting techniques. Once the fundamentals are established the session moves into the topics of troubleshooting techniques, analysis, and problem solving.

Program participants will have the opportunity to obtain a broad working knowledge of troubleshooting principles and practice, to gain insight into both traditional and advanced techniques, and to interact with others working in plants. The program is ideal for personnel involved in plant troubleshooting, process engineering, plant operations, and technical services. Process personnel from operating, design, and construction companies, as well as others providing services to the petroleum and petrochemical industries, should also find this program beneficial.

Course Duration and Delivery

Typical course duration is 3 to 5 days based on the background of the participates. One of our Senior Technical Professional with over 25 years of experience would lead the class. Instruction can be in house or in an online seminar.

Syllabus

1. Introduction

   - Overview of the Processing Industry
   - Chemistry of the Processing Industry
   - Safety for the Operation and Maintenance Groups

2. Introduction to Troubleshooting

   - Typical Equipment Problems
   - Integration of Process, Equipment and People
   - Troubleshooting Techniques
   - Troubleshooting Tools

3. Crude Oil

   - Sources of Crude
   - Composition of Crude
   - Description of Crude Oil Fractions
   - Definition of Physical and Chemical Processes
   - Crude Oil Testing
   - Crude Assays

4. Refining Products

- Lights Ends
- Naphtha
- CMS
- Kerosene / Jet Fuel
- Diesel
- Gas Oils
- AGO
- Lube Oils
- LVGO
- HVGO
- Residues

5. Refinery Unit Flowsheets

- Crude Atmospheric Tower Units
- Vacuum Tower Units
- FCC Units
- Alkylation Units
- Catalytic Reformer Units
- BTX Units
- Coker Units
- Isomerization Units
- Hydrotreater Units
- Hydrocracker Units
- DAO / SDA Units
- Utilities

6. Refinery Furnaces

- Overview of Process Furnace
- Safe Commissioning of a Process Furnace
- Design of Furnaces
- Burner Management Systems
- Economics – Excess Air Control, Flame Pattern
- Trouble Shooting
- Case Study
  - Hydrotreater Furnace damage from fire
  - Placement of Instrumentation
- Maintenance Guidelines
- Safety

7. Boilers and Steam Systems

- Overview of Boilers and Steam Systems
  - Boiler Film
- Safe Commissioning of Boilers and Steam Systems
- Design of Boilers
- Burner Management Systems
- Economics–Excess Air Control, Demin Water and Condensate
- Trouble Shooting
- Case Studies
  - Boiler Safety Case Study
- Maintenance Guidelines
- Safety

8. Steam Turbines, Pumps and Compressors

- Overview of Rotating Equipment
- Safe Commissioning of Rotating Equipment
- Design of Rotating Equipment
- Economics – Steam Temperature, Preventative Maintenance
- Trouble Shooting of Rotating Equipment
- Case Study
  - Compressor Check Valve Case Study
  - Small Bore Piping Case Study
- Maintenance Guidelines
- Safety

9. Refinery Distillation

- Overview of Distillation Equipment
- Safe Commissioning of Distillation Equipment
- Design of Distillation Equipment
- Economics – Reflux Optimization, Reboiler Optimization, Tray Efficiency
- Designing for Fouling Service
- Designing for Vacuum Service
- Designing Crude Unit Towers
- Trouble Shooting
- Case Studies
  - Refinery Case Study
  - Gamma Scan on Vacuum Tower
  - Installation Case Study
  - Crude Unit Troubleshooting
- Maintenance Guidelines – Tray verses Packing
- Safety
  - Texas City Case Study

10. Piping and Heat Exchangers

- Overview of Piping and Heat Exchanger Equipment
- Safe Commissioning of Piping and Heat Exchanger Equipment
- Design of Piping and Heat Exchangers
- Economics – Heat Exchanger Monitoring
- Trouble Shooting
- Case Studies
  - Piping Check Valve Case Study
  - Heat Exchanger Case Study
  - Hot Tapping Case Study
- Maintenance Guidelines
- Safety – Pressure Concerns

11. Process Control Systems

- Overview of Process Control Systems
- Safe Commissioning of Equipment utilizing Process Control Systems
- Design of Control Systems
- Economics – Process Optimization and Integration
- Process Control Schemes
- Safety Integrity Levels
- Trouble Shooting Instrumentation
- Case Study
- Maintenance Guidelines
- Safety

12. Desalter Systems

- Overview of Desalter Systems
- Safe Commissioning of Desalter Equipment
- Design of Desalters
- Trouble Shooting
  - Corrosion, Fouling, Contaminants
  - Single Versus Two-Stage
  - Operation
  - Salt Content and Removal Efficiency
- Case Study
- Maintenance Guidelines
- Safety

13. Reactor and Catalyst Systems

- Overview of Reactor Systems
- Evaluation of Catalyst
- Trouble Shooting Reactors and Catalyst
- Case Study
- Safety

14. Process Optimization

- Develop Optimization Plan
  - Typically Target USD 10.0 Million in Savings
- Evaluate Existing Equipment
- Conduct High Load Test
- Fix low or no cost bottlenecks
  - Target 10% to 20% additional capacity
- Set energy targets
  - Target 3% to 10% energy reduction

Who Should Attend:

- People who are making day to day decisions regarding operation and economics of processing plants;

    1. 1st Line Operations personnel,
    2. Operation Supervisors,
    3. 1st Line Maintenance personnel,
    4. Maintenance Supervisors,
    5. Senior Plant Supervisors,
    6. Operations Engineers
    7. Process Support Engineers,
    8. Design Engineers,
    9. Cost Engineers.

- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding in Processing Plant Operations.

- Other professionals who desire a better understanding of subject

What You Can Expect to Gain;

- The Refinery Process Unit Equipment Fundamentals – how each system functions from a hands on viewpoint
- Safe commissioning and utilization of process equipment
- Maintenance Guidelines
- Process furnace concepts and application
- Rotating equipment concepts and application
- Distillation concepts and troubleshooting
- Process Control guidelines
- Refinery, Furnace and Distillation Case Studies
- Troubleshooting Concepts