Ethylene Unit Pyrolysis Furnace Design, Optimization and Troubleshooting Training Course

Introduction

The success of every company depends of 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 is an investment in future success - give yourself and your employees the keys to success

It is strategically important that your operations 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.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts is very 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 on going continuous life long goal.

Course Objective

This course will guide the participates to develop key concepts and techniques for the optimization of Ethylene Unit Pyrolysis Furnace Design, Optimization, and troubleshooting. These key concepts can be utilized to make operating decisions that can improve your unit's performance.

Many aspects of fired heaters operations and management can be improved including, energy utilization, product improvements, furnace tube life, and safety. This cannot be achieved without first an understanding of basic fundamental principles of design and operation. These principles need to be understood in advance of operating and trouble shooting a process unit operation for the manager or problem solving to be effective.

This seminar focuses on the core building blocks of the fired heater systems, equipment and economics. This program will emphasize fired heater unit operation fundamentals, safe utilization of these fundamentals by operations and maintenance personnel, and equipment troubleshooting techniques.

Course Duration and Delivery

Typical course duration is 3 to 5 days based on the background of the participaites. 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 webinar.

Outline

1. Introduction

    - Overview of the Chemical Processing Industry

2. Review of Process Incidents

    - Safety for the Chemical Processing Groups

3. Fundamentals of Petroleum Chemistry

    - Description of a Hydrocarbon Molecule
    - Types of Hydrocarbon Molecules
    - Chemistry of Combustion

4. Introduction to Troubleshooting

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

5. Introduction to Fired Heaters

    - General Types
    - Fire Box
    - Convection
    - Stack
    - Burners

6. Fired Heater Engineering

- Fluid Flow
- Heat Transfer
- Fuels
- Design Guidelines

7. Improve the Efficiency of Fired Heaters

- Excess Air
- Burner Types
- Flame types

8. Introduction to Fired Heater Control

- Burner Management Systems

9. 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 Commissioning Safety Case Study
- Maintenance Guidelines
- Safety

10. Revamping Fired Heaters

- Upgrade Convection Section
- Upgrade instrumentation and Controls
- Maximizing furnace life
- Designing for improved maintenance

11. Reducing NOx Emissions

13. Ethylene Overview

- Typical Ethylene Flowsheets
- Comparison of Flow Schemes
- Ethane Flowsheet
- E/P Flowsheets
- Naphtha Flowsheets
- Furnace Overview
- Quench Systems Design and Operation
- Compression Overview
- Separation
- Refrigeration
- Hydrogenation Acetylene Reactor Catalyst Review
- Molecular Sieve
- Flare Safety Review
- Ethylene Process Variables
- Ethylene Economics

14. Ethylene Furnaces

- Overview of Ethylene Furnace
  - Historical Development
  - Design Constraints
    - Residence time
    - Partial Pressure
    - Low Pressure
  - Comparison of Current Designs
    - One pass coil
    - Two pass U coil
    - W coil
    - Hybrid coil
  - Furnace Run lengths
    - Design and normal run lengths of current designs
    - Factors affecting run lengths
  - Anti-Coking
    - Comparison of technologies
  - Future Opportunities
    - Catalytic
    - Latest patents
- Safe Commissioning of a Process Furnace
- Design of Furnaces
  - A. Pyrolysis
  - B. Radiant Coil
  - C. Coking
  - D. De Coking
  - E. Burners
  - G Convection
  - H. Control
  - I. Revamps
- Burner Management Systems
- Economics – Excess Air Control, Flame Pattern

- Trouble Shooting
  - Convection Bowing
  - Insulation
  - External transition designs
- Case Study
- Maintenance Guidelines
- Safety

15. Conclusions

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 Ethylene Furance 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
- Distillation concepts and troubleshooting
- Process Control guidelines
- Troubleshooting Concepts
- An detailed overview of furnace operations, processes and economics
- Gain an understanding of the equipment of a process furnace
- Gain an understanding of the Olefin furnaces