Fired Heaters for Operators

Potential PDH: 8

Description:

This is a starting point for the class content and will be adjusted together with the site. The blocks shown below are typical modules Becht finds value in discussing with operations teams.
Site priorities:

1. Safety considerations (ex: fuel long scenarios, etc.)
2. Operator focused, keep it practical and hands on
3. Gain confidence in what site is doing on their fired equipment
4. Basic heater tuning

Outline:

1. Introduction – Aims and Goals of Training
   - Safety Considerations.
   - Why Furnace Operator Training?
   - Identification of Heater(s) on Site.
   - Fuel Consumption (Efficiency).
   - Aims, Reliability, Efficiency.
2. Site Basics of Combustion – Fuel Gas / NG
   - Basic Requirements Combustion / Heat Transfer
   - Basic Stoichiometry
   - Gas Flooded Heaters
   - Symptoms / Causes for Combustion
   - O2 and Excess Air
3. Site Burner
   - Burner Operation – Type of Burners
   - Forced Draft / Natural Draft
   - Flame Type (Color / Flame Lengths / shape / etc.)
   - Burner Capacity (Firing Duty – Design/Maximum / Normal / Turndown)
   - Fuel Pressures (High / Low Fuel Pressure / Normal)
   - Air Register / Pilots / Ignitors / Flame Detectors
   - Common Air Plenum
4. Environmental Considerations

- Influence of Trace Gases
- Environmental Legislation
- CEMS
- NOX
- Emissions Reduction Methods

5. Fired Heater(s) (Mechanical Considerations)
   - Site Heater Types
   - Components of Site Heater(s)
   - Efficiency
   - Process Considerations
   - Refractory (Types – Castable / Fibre / Brick / Modules)
   - Decoking (pigging / steam air / reforming)
   - Tube Failures
6. Stacks & Draft
   - Definition of Draft
   - Purpose for Draft
   - Forced Draft versus Natural Draft
   - Readings
   - Factors Affecting Draft
   - Too Much Draft
   - Too Little Draft
   - Measurement Points
   - Benefits for Good Draft
   - Air Leakage?
7. Combustion Control & Safe-Guarding
   - Instrumentation
   - Safe-Guarding (Trips, Alarms, etc.)
8. Start-Up and Daily Operations (Safety Considerations)
   - 12 – Basic Rules
   - Monitoring Tools / Integrity Asset Program
   - Tube Skin Thermocouples
   - Thermography
   - Optical Pyrometers
   - Portable Analyzers, Sample Station (O2, Pressure, etc.)
   - Maintenance (Cleaning Burners, Leakage Issues, etc.)

Subject Matter Expert (SME):

Belal Hassoun, P. Eng., is a seasoned professional with 25+ years in oil and gas, specializing in fired

equipment engineering. His roles have included Design Engineer, Sr. Fired Equipment Engineer, Package Engineer, and Consultant. Belal has led/participated in numerous projects, including a high-profile FAIR at Kuwait's KNPC Shuaiba Refinery and the evaluation of a new ferrule system in a Sulphur Recovery Unit. These projects resulted in significant cost savings and operational improvements. He holds a Bachelor's in Chemical Engineering from the University of Calgary and is known for his collaborative approach and commitment to delivering results.