Delayed Coking Process Technology

Potential PDH: 24

Description:

In order to increase the value of heavy oils, many refiners use delayed coking. This heavy oil upgrading scheme is really the last-remaining batch process utilized in petroleum crude refineries. There are currently 63 DCU's operating in the US, and more around the world. Becht is proud to provide an in-depth discussion of this unique process which involves high temperatures, complex chemistry, and very unique specialty equipment and systems. Safety, Reliability, Design & Troubleshooting considerations are woven into the presentation topics. Daily group problem solving sessions are included relative to real world problems and economic considerations. Just a few of the learning objectives are understanding....

- How a coke bed forms
- Trade-offs in coker feed rate and equipment reliability
- The difference between coker natural recycle and distillate recycle
- How to effectively on-line spall coke from furnace tubes
- What a coker blowdown system does
  How to safely & reliably get coke out of the drum, and much more....

Outline:

Introduction
- Attendee Backgrounds & Expectations
- DCU in Refinery Flow Plan
- History of Coking – Delayed, Fluid & Flexi
  - Delayed Coking & Safety Progress
- Equipment Flows & Overview
- Unique Specialty Systems – Coker Blowdown, Coke Cutting & Coke Handling

Feeds, Reactions & Coke
- Feedstocks – Types & Measures
- Crude Unit Effects
- Operating Conditions & Yields
- Thermal Cracking Chemistry
- Coker Severity – Temperature, Pressure & Recycles
- Making Coke – Areas to Avoid & hitting the target, the Coke Drum
- Types of Coke made in the Drum – GPC, CPC, Anode & Needle and their Dispositions

Coker Feed System
- Feed Tankage
- Surge Drums
- Combination Tower
- Heater Charge

Coker Furnaces
- Design, Operations
- Coil Tube Coking
  - Traveling through the Coil
  - Thermocouples
  - Infrared Measurement
  - Tube Life - Creep & Carburization
  - Metallurgies
  - COT measurement
- Decoking
  - On-Line Spalling
  - On-Line Pigging
  - Off-Line Steam-Air Decoking
  - Off-Line Pigging

Transfer Line from Furnace to Coke Drum
- What is happening inside is often misunderstood
- Managing coking
- Mechanical considerations

Coke Drums – While Coking
- History & Overview
- Coke Bed Formation
- Fatigue Life
- Antifoam-Carrier optimization
- Vapor Line Quenching & Slop Oils
- Pressure Relief considerations

Coke Drums - Decoking
- Emphasis on optimization considerations
- Switching – Steaming
- Cooling – Sludge & Water
- Opening
- Coke Cutting
  - The Procedure

  - Components – water side & derrick side
  - Managing Fatigue Life
  - Safety Keys
- Closing
- Warming

Key Performance Variables
- Furnace, Coke Drums,
- AntiFoam, Petcoke
- Main Fractionator
- Blowdown System
- Environmental Areas

Specialty Equipment
- Coke Drum Structure Valves
- Slide Valves
- Blowdown System

Coke Handling System Equipment
- Coke Pits
- Coke Pads
- Gantry Crane
- Coke Grizzly
- C oke Crusher
- Coke Conveyor
- Coke Load out

Coker Water Systems
- Mazes
- Clear Water Sumps & Pumps
- Hydrocyclones
- Closed Slurry Systems & Hydrobins
- Cutting/Quench Water Tanks

Special Procedures
- Startup & Shutdown/Decontamination
- Low Temperature Drums

Final Discussion / Q & A

Who Should Attend:

The presentation applies to those professionals who are interested in getting a thorough introduction to all aspects (process, mechanical & operational) of delayed coking as part of a full 3-day course. It is primarily oriented toward engineers, operations personnel and service providers grounded in refining fundamentals – tower fractionation & heat balances, pump operations, valve basics, and fluid flow.

Subject Matter Expert (SME):

Mitch Moloney graduated from Princeton University in 1979 with a BSc in Chemical Engineering and is a Texas registered PE. He worked with ExxonMobil for 40 years, prior to entering the consulting world in 2019, working with Becht the last 4 years as a process engineering and resid upgrading specialist. He began his career at the Exxon Bayway Refinery in NJ, then joined the resid upgrading world in 1989 with Mobil, and has focused on delayed coking, visbreaking and resid upgrading since. He has been providing course instruction over his career in process design, process troubleshooting, pressure relief valves, and, of course, heavy oil upgrading. Career highlights were serving as the process design & start-up lead for the Venezuelan Cerro Negro Upgrader in 2001 and start-up lead for the Antwerp DCU in Belgium in 2018. He enjoys family, delayed coking, languages (Spanish, Dutch, French), art, and sports.