A New Petroleum Coking Process

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History

- Founded in 2002
- Owner/Inventor Doug Sullivan, P.E.
- Conducting coking test program to validate science
- Currently funded by owner, seeking capital to commercialize the process
- Owned and operated manufacturer's representative firm, Whitson Sullivan Co. for over 30 years
- Extensive experience in chemical engineering design and development for chemical and refining industries
Concept Origination

 Origination:
➢ Chemical process that employs special devolatilizer
➢ Process converts a tarry residue into solid carbon particles
➢ Recovers valuable vaporized volatile compounds
➢ Secrecy surrounding process meant this devolatilization process never publicized

Process Description

 Continuous LIDCON Process
➢ Continuous versus batch process
➢ Closed system compared to the open drums during decocking of drums in delayed coking process
➢ Unique reactor-devolatilizer applies a mixing and kneading action to the viscous coker feed stream
➢ Creates constant exposure of new interfacial surface between the viscous mass and the gas phase
➢ Releases most volatiles into the gas phase where current batch processes traps many volatiles in the solidified coke
Process Flow

LIDCON PROCESS

Heater

LIDCON Reactor/Devolatilizer

Coke

Fractionator

NAPTHA

Light Gas Oil

Heavy Gas Oil

Residue Feed

Devolatilizer Description

- Prototype
  - Rotating disks pass close to stationary arms
  - Produces kneading action on viscous mass
  - Close clearance assures internals continuously clean sticky mass
LIDCON Advantages

- LIDCON continuous coking process will:
  - Recover currently wasted valuable hydrocarbons
  - Reduce capital expenditures and operating costs
  - Reduce energy and utility consumption
  - Reduce the environment impacts of petroleum coke production
  - Reduce the manpower required to produce petroleum coke
  - Minimize waste water
  - Increase safety
  - Eliminate worker exposure to petroleum coke and its byproducts
  - Produce more uniform petroleum coke quality

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Refiner Financial Benefits

- Refiners will benefit financially by:
  - Reduced capital expenditures - lower cost to construct new coker plant (30-40% less)
  - Retrofitting existing plants expect to yield ROI in 3 to 4 years
  - An average coker unit* will receive a benefit of $11.5 Million/year
  - Additional financial impact
    - Reduced manpower expense
    - Reduced medical and insurance expense due to improved safety
    - Potentially reduced liability of job related accidents
    - Reduced water treatment expenses

*Average coker unit ~ 40,000 B/D: collected volatiles approximately $9 Million/year increased revenue and units Savings of approximately $2.5 Million/yr

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Refiner Financial Benefit

- Analysis of Financial Benefit

3% Recovery of VM
Utility Savings
Misc. (incl. manpower, insurance, water treatment)

Summary

- LIDCON Advantages over Delayed Coking:
  - Lower capital cost for new plants
  - High return on investment for modifying Delayed Cokers to LIDCON
  - Recover more volatiles
  - Eliminate air emissions
  - Reduce steam and water consumption
  - Improve worker safety