Best practices to increase productivity and reliability of delayed coker units

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Best practices to increase productivity and reliability of delayed coker units

**Background**

High historical profit margins are associated with a delayed coking unit, so it is important for refiners to maximize its productivity and reliability.

However delaying coking is a unique process with unique challenges to manage:

- Batch process
- Extreme temperatures
- Highly viscous feed
- Coke-cutting and handling
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**Objectives**

1. Maximize Reliability and Operability

2. Improve Safety and Reduce Environmental Impact

3. Minimize Operating, Maintenance and Investment and Operating Costs
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**Reliable Design Data**

Continued update of yield model based on operating and pilot data
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Heaters

Use of 6-pass double fired coker heaters for larger coke drum module capacities and 3-pass double fired heaters for smaller coke drum capacities

Longer run lengths. Allows use of on-line spalling
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**Heaters**

- Better on-line spalling procedures; more effective and efficient resulting in increased run lengths. On-line pigging also possible.
- Over 5 years run length between turnarounds
- Fully modularized design for lower installed cost
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**Coke Drums**

- **More Robust Design**
  - Single thickness drum wall.
  - Optimized crotch radius for weld build up hot box cone/straight wall detail.
  - Integral forged ring skirt design on cone/straight wall detail.
  - Use of anchor bolts with disk spring allows base plate flexibility.

- **Inspection Lanes and removable insulation support for frequent inspection of critical weld seams**

- **Monitoring and Inspection Program**

- **Operating Guidelines**

Over 10,000 cycles in lifetime
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**Blowdown System**

- Shed deck trays vs. disc and donut trays
- External steam heater
- Vent Gas recovery
- Wax tailings / Slop backwash to quench

Easier to operate and maintain
Best practices to increase productivity and reliability of delayed coker units

**Fractionator**

- Water wash systems
- Wash oil spray chamber
- Fractionator bottom fines removal

Increase reliability. Reduce maintenance
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**Coke Drum Lines and Valves**

- Increased use of steam purged valving for better operations (SP8 – 14)

- Independent coke drum overhead lines for better piping stress with large diameter, low pressure and high capacity systems.

- Use of more interlocks to prevent hydrocarbon to atmosphere

Easier, Safer and Environmentally Friendlier Operation
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**Coke Cutting and Dewatering**

- Improved Maze designs: Improves fines recovery, reduce overflow
- Decoking Water Tank: size & Internals
- Drain of Coke Drum to Pit / Pad
- Electric Drivers for Winch and Rotary Joint

Easier, Safer and Environmentally Friendlier Operation
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Safety

Process-specific hazards:

- Coke drum switching
- Coke drum head removal
- Coke cutting
- Coke transfer

Easier and Safer Operation
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**Environmental**

- Low / ultra-low NOx burners / Selective Catalytic Reduction
- Coke wetting systems
- Breakers vs. crushers
- Enclosed coke storage & conveyors
- Vent gas Ejector for Coke Drum Depressurization

Environmentally Friendlier Operation
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**Automation and Controls**

- Automated Batch vs. Total Automation Operation (no operators in structure)

Easier and Safer Operation
To protect the investment in a Delayed Coker and maximize profitability, a skilled workforce is required to:

- Efficiently operate and maintain the equipment
- Support the process
- Improve Safety
- Minimize Environmental Impact
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Training

Industry Challenges Driven By:

- Skilled Workforce Attrition
- Institutionalizing Best Practices
- Compliance Mandates
- Training Resource Limitations
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**KnowledgeWeb™ Online Training**

- Improves operator performance with a dynamic learning environment
- 24/7 Real time access anywhere, anytime with the internet and a browser
- Customized: Unit / Site Specific
- Helps to maximize yields by applying the knowledge of the unit designers
- Helps to improve reliability by incorporating the knowledge and maintenance procedures of the different process equipment

Efficient training tool to improve on-boarding of new hires and up-skill existing workers in DCU safety and operations