



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

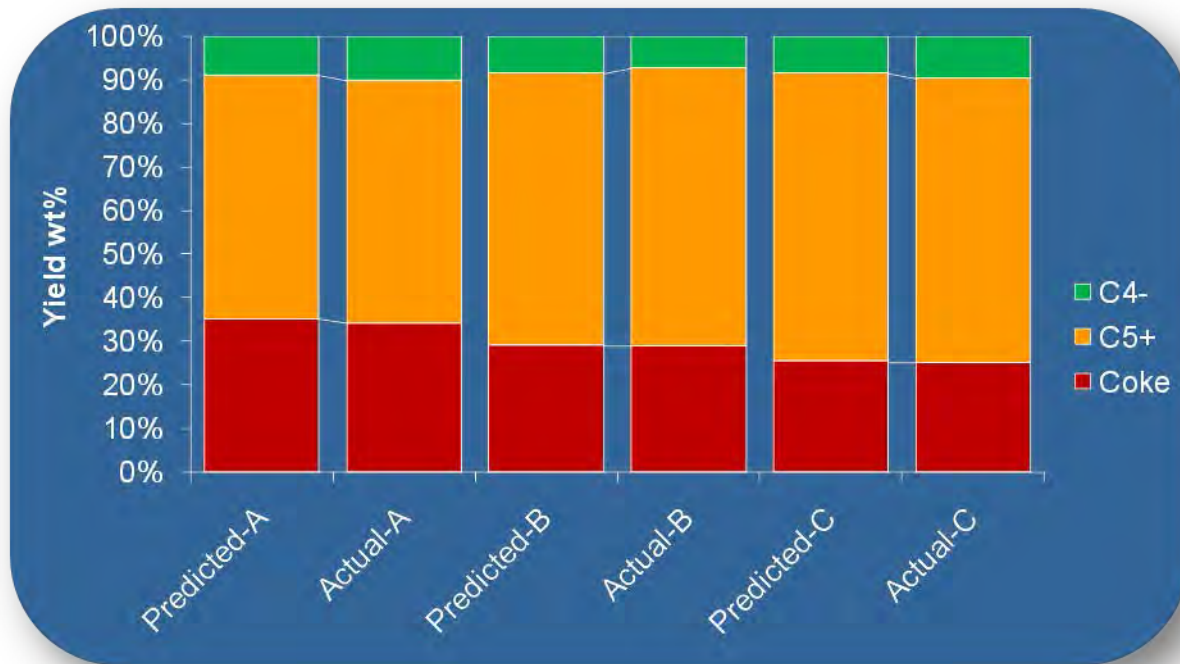
Best practices to increase productivity and reliability of delayed coker units

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

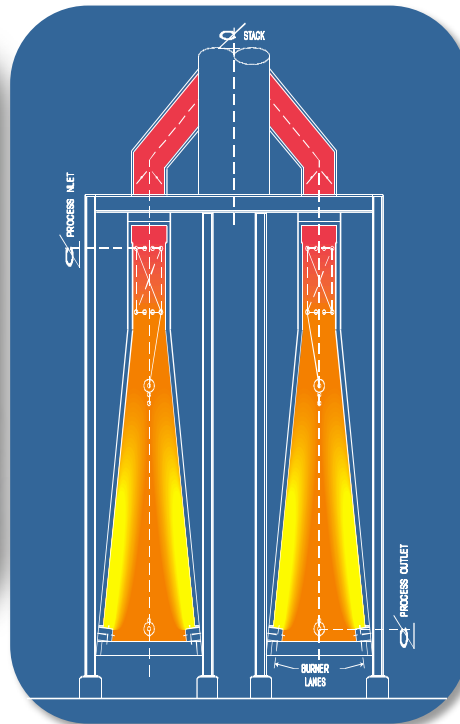


Continued update of yield model based on operating and pilot data

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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

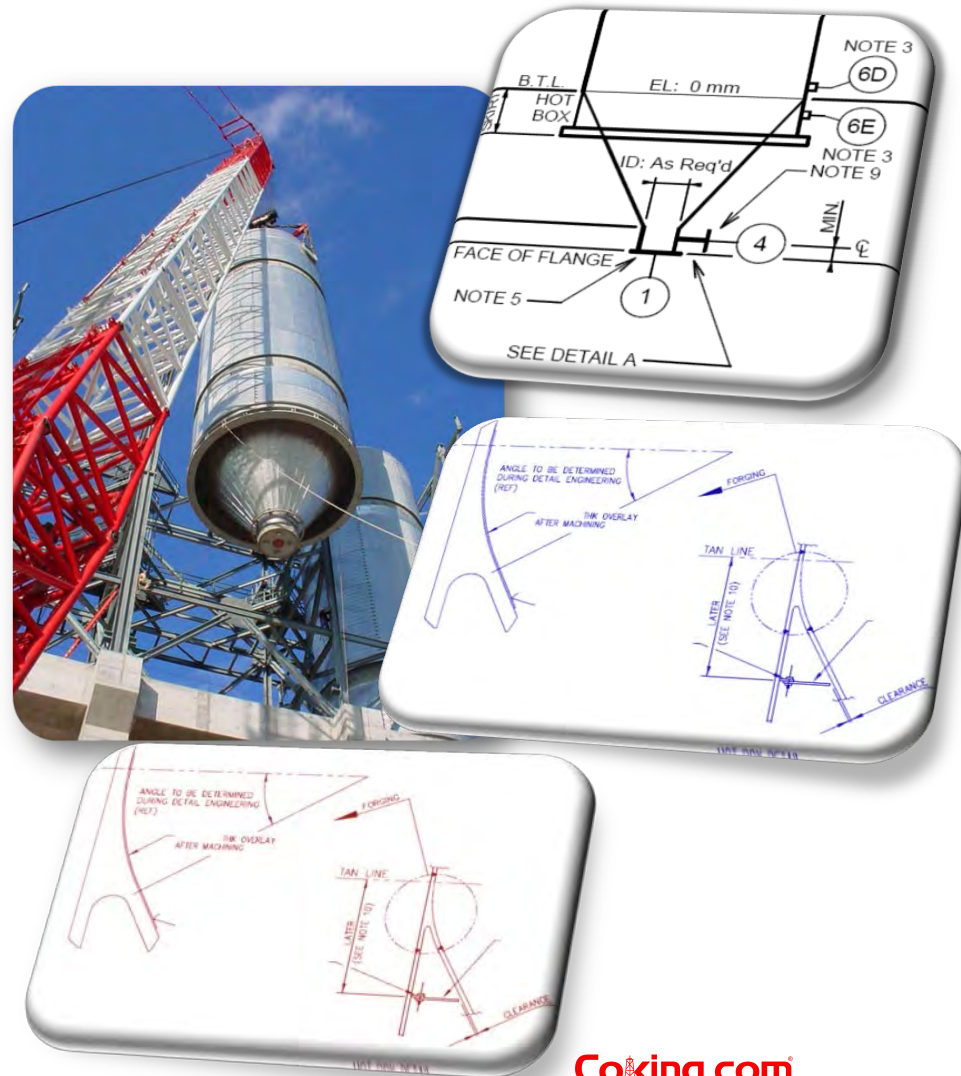


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Coke Drums

- 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

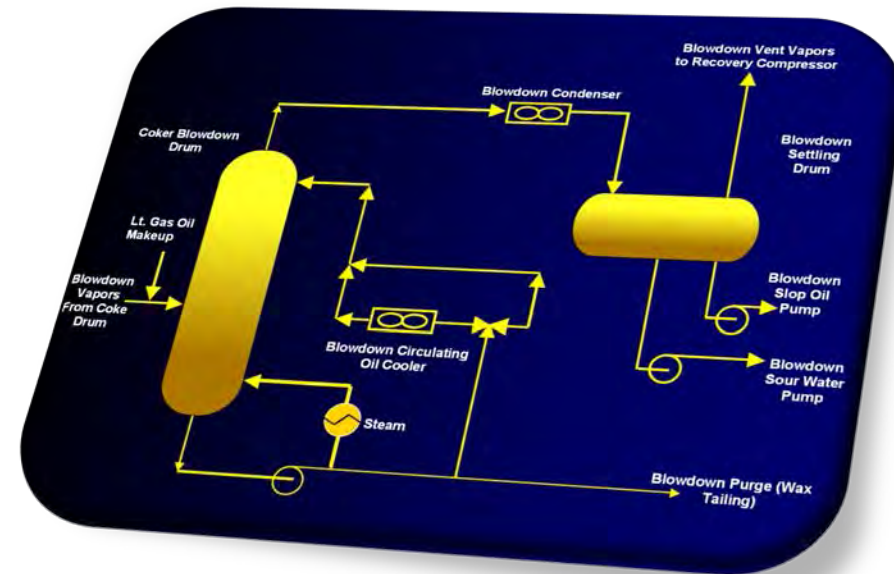
Over 10,000 cycles in lifetime



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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

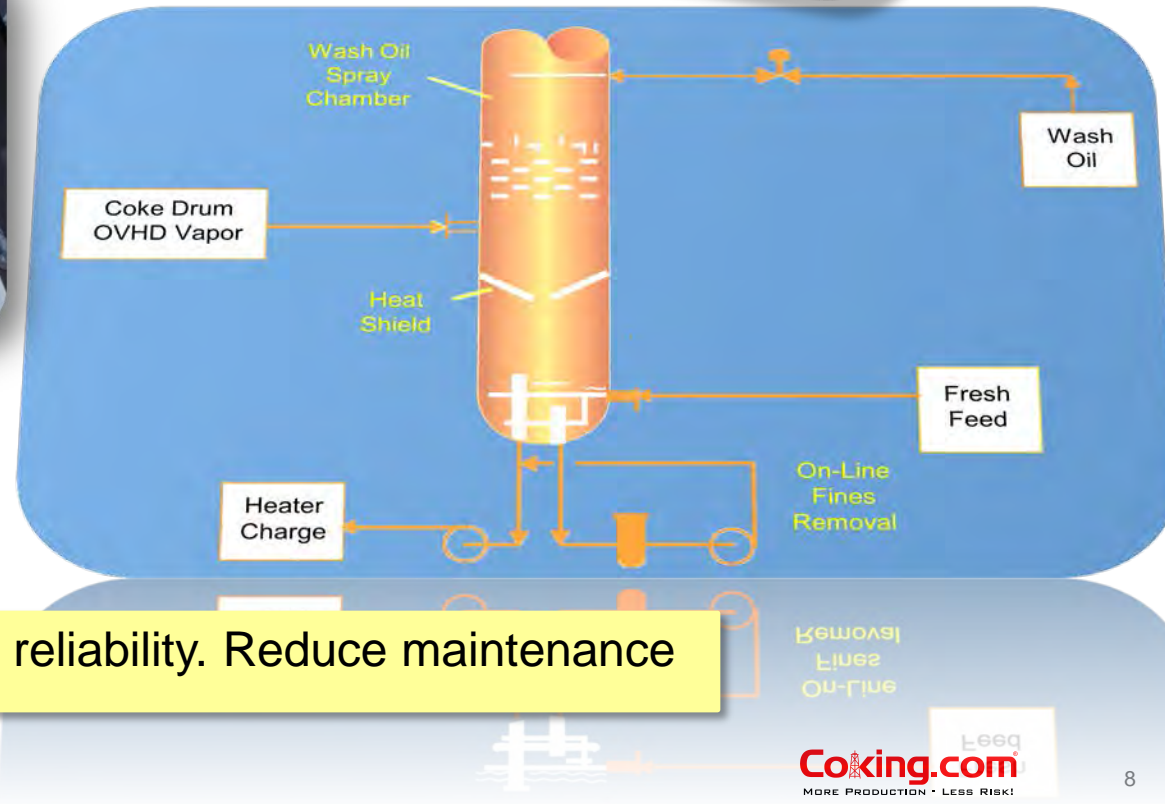
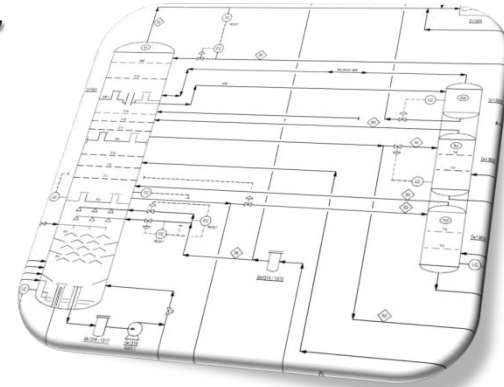


Easier to operate and maintain

Best practices to increase productivity and reliability of delayed coker units

Fractionator

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



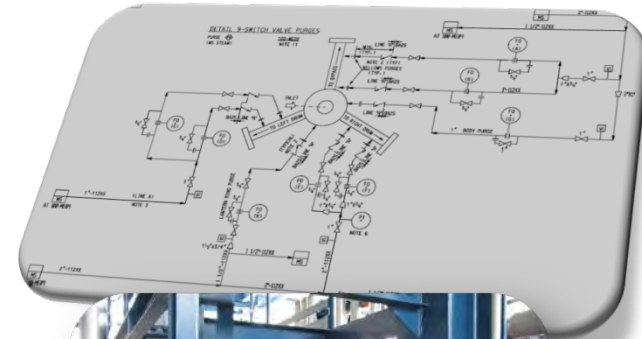
Increase reliability. Reduce maintenance

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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

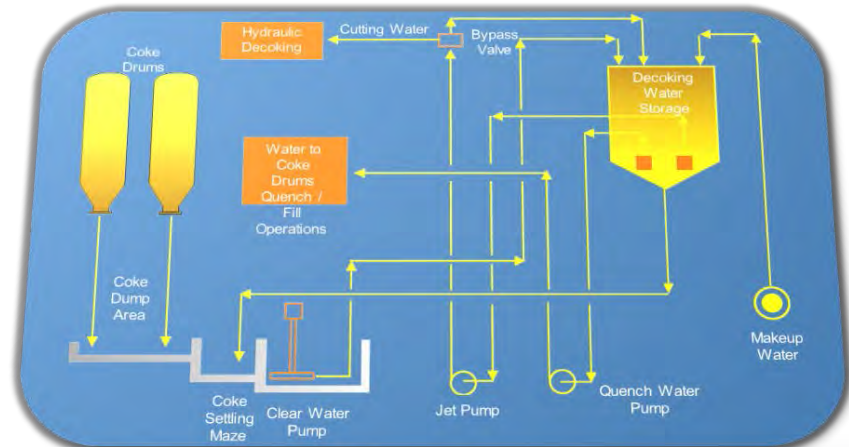
Easier, Safer and Environmentally
Friendlier Operation



Best practices to increase productivity and reliability of delayed coker units

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

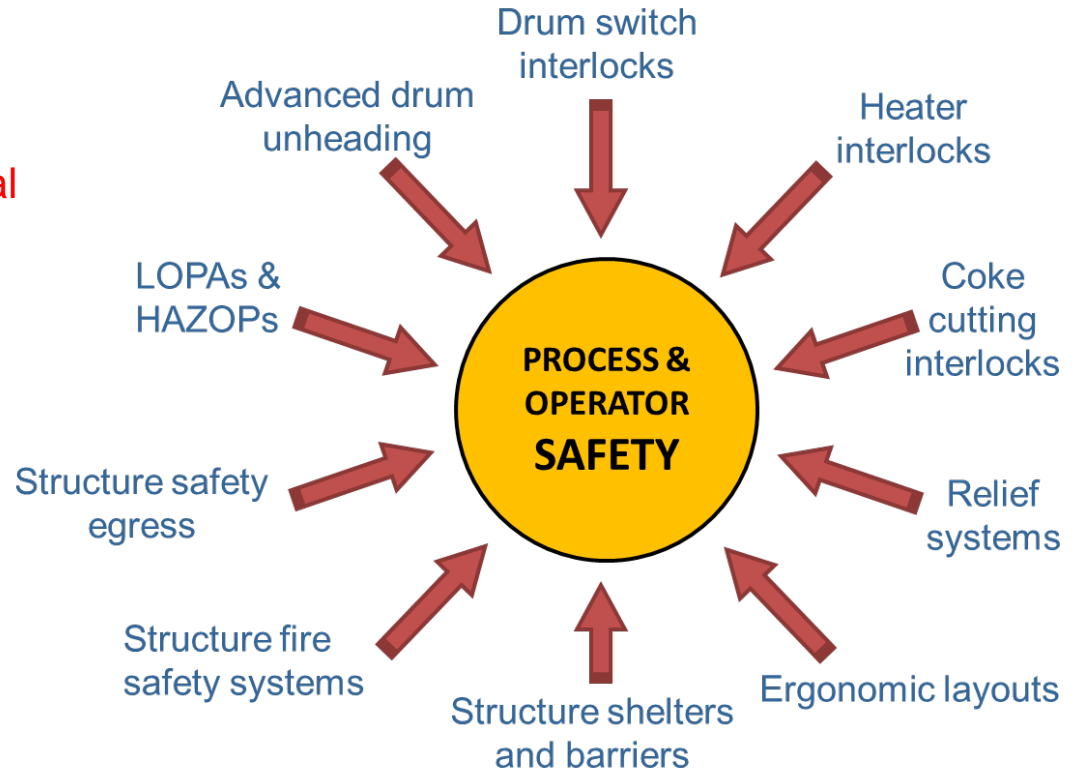


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Safety

Process-specific hazards:

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



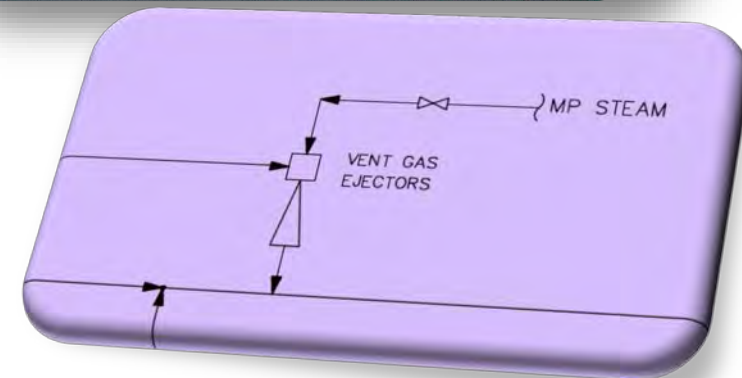
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Easier and Safer Operation

Best practices to increase productivity and reliability of delayed coker units

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

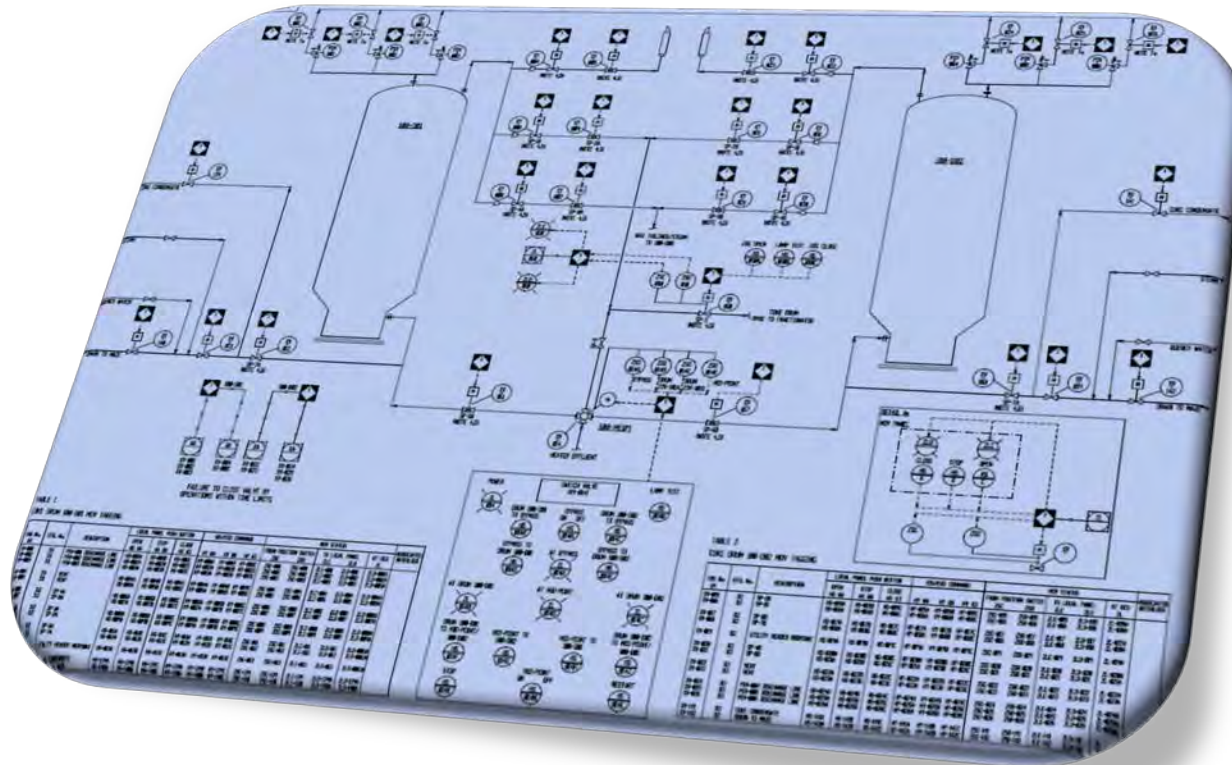


Environmentally Friendlier Operation

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Automation and Controls

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



Easier and Safer Operation

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Training

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



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