
CURTISS WRIGHT
Flow Control Company
DeltaValve

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DeltaValve

Industry Leading Coke Drum Unheading and Center-Feed Technology

New Delhi, India
September 30 – October 4, 2013

Elango Narendran
Director of Product Management

Coking.com®
MORE PRODUCTION - LESS RISK!

Traditional Coke Drum Unheading

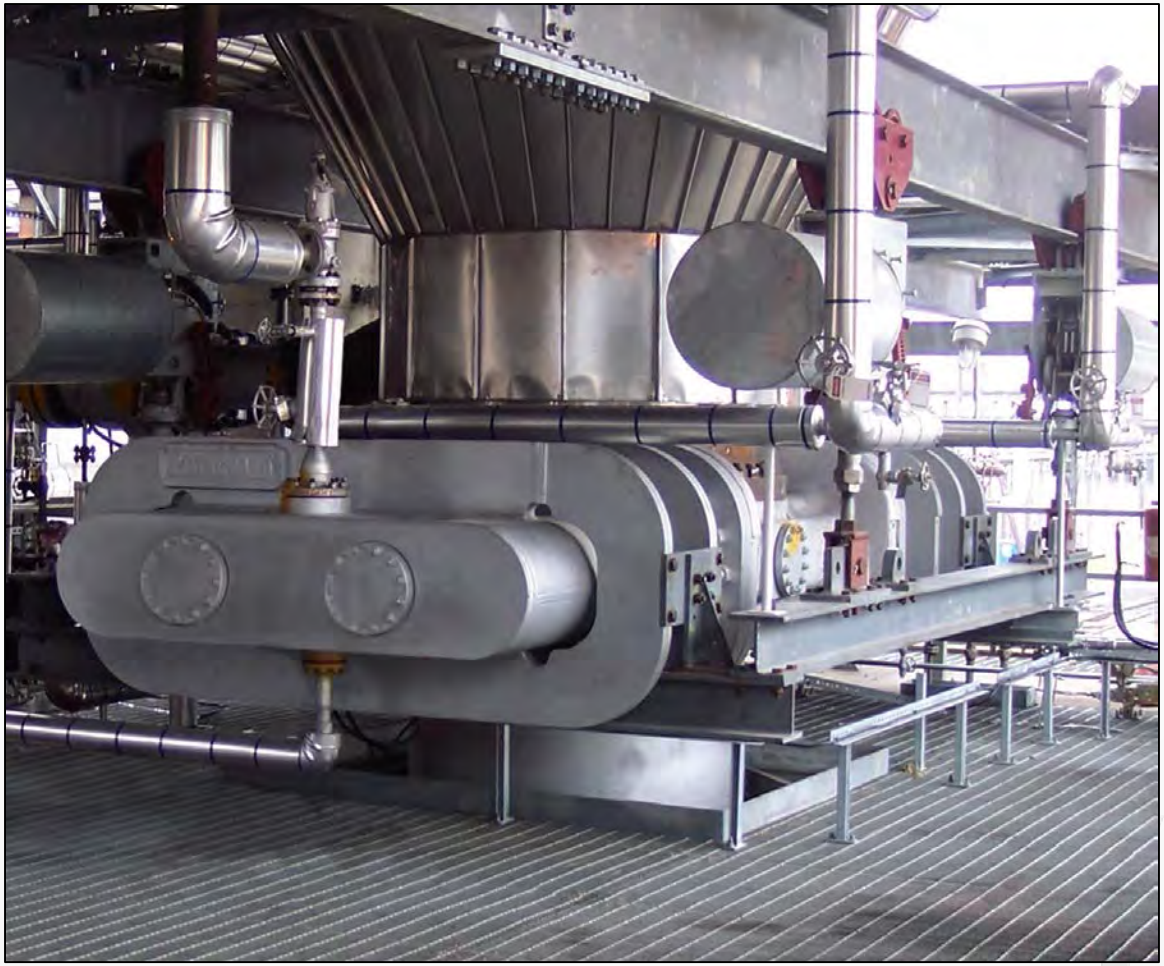
- Traditional coke drum unheading is:
  - Unreliable
  - Expensive to maintain/repair
  - Time consuming
  - Inherently unsafe

Traditional Coke Drum Unheading

- Traditional coke drum unheading has been responsible for:
  - Unplanned downtime
  - Near misses
  - Disabling injuries
  - Fatalities

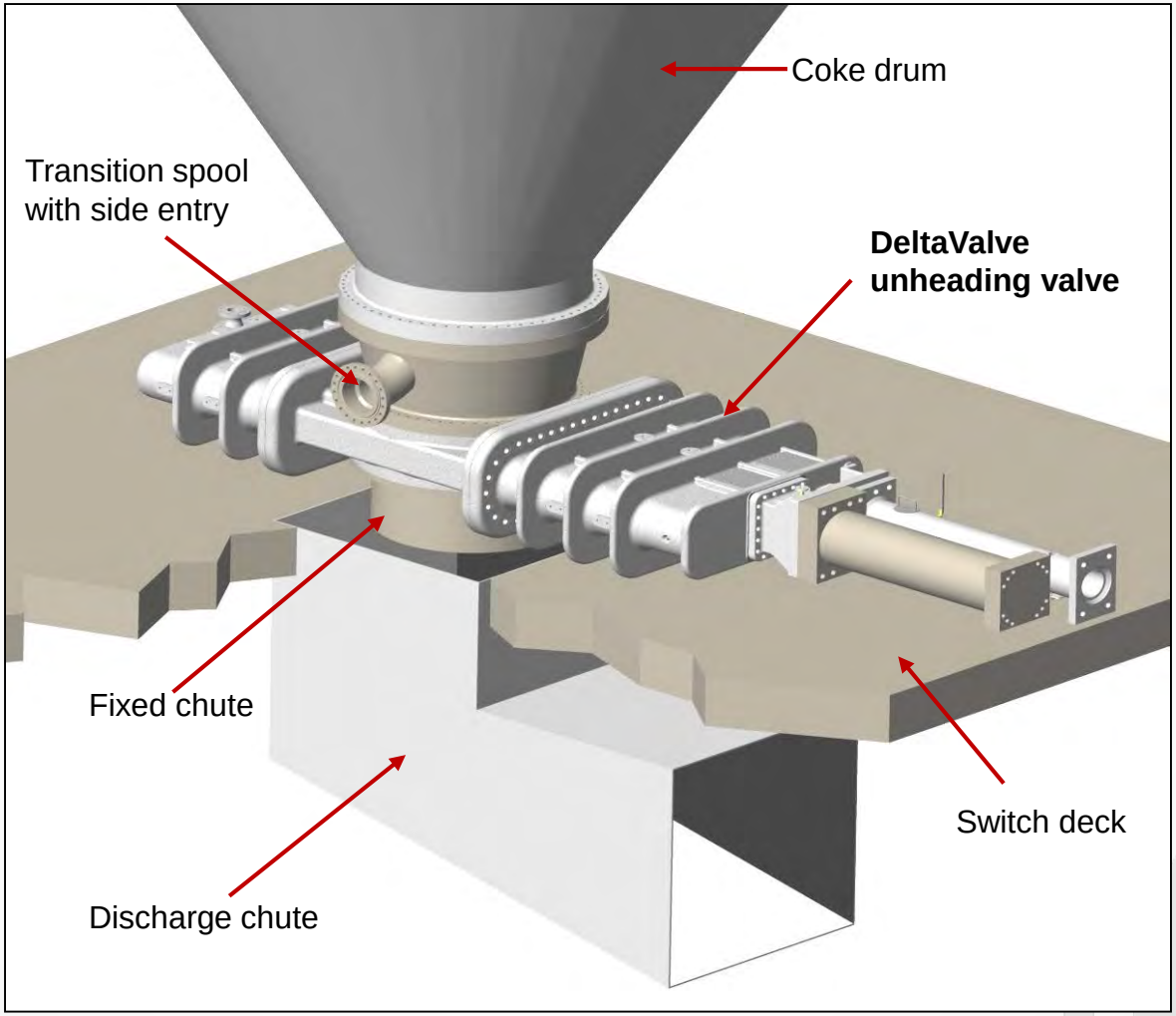
The DeltaValve Solution

Fully Automated Coke Drum Unheading



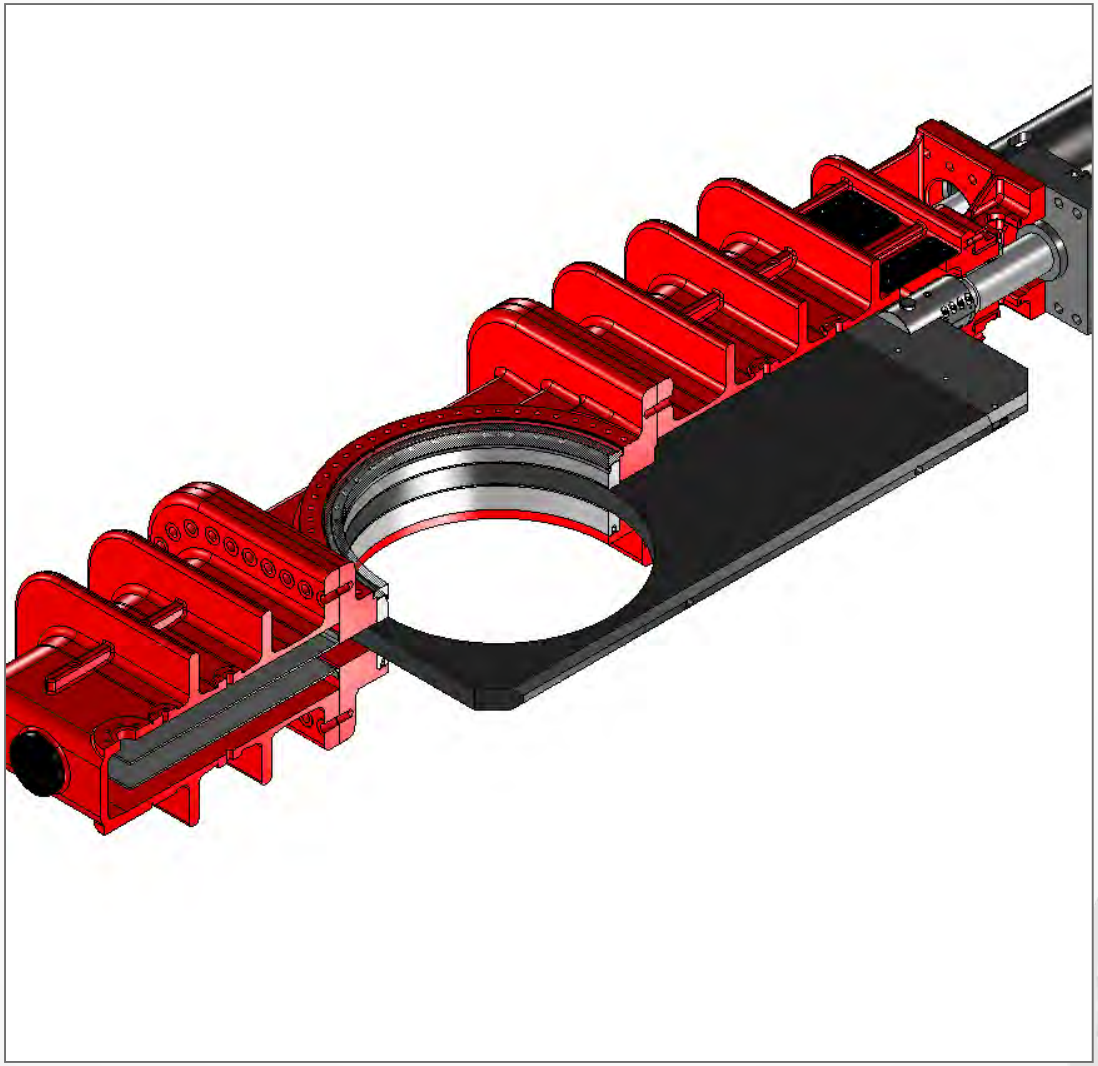
The DeltaValve Solution

Totally Enclosed, Safe, Simple, Reliable Unheading



DeltaValve Coke-Drum Unheading

Totally Enclosed, Safe, Simple, Reliable

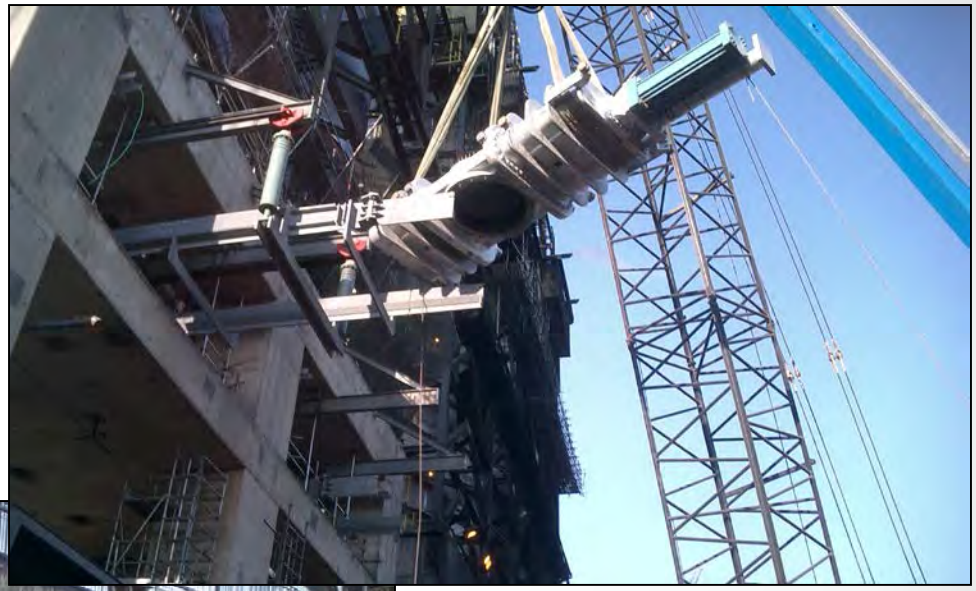


DeltaValve Coke-Drum Unheading

Worldwide Installations

DeltaValve Coke Drum Unheading

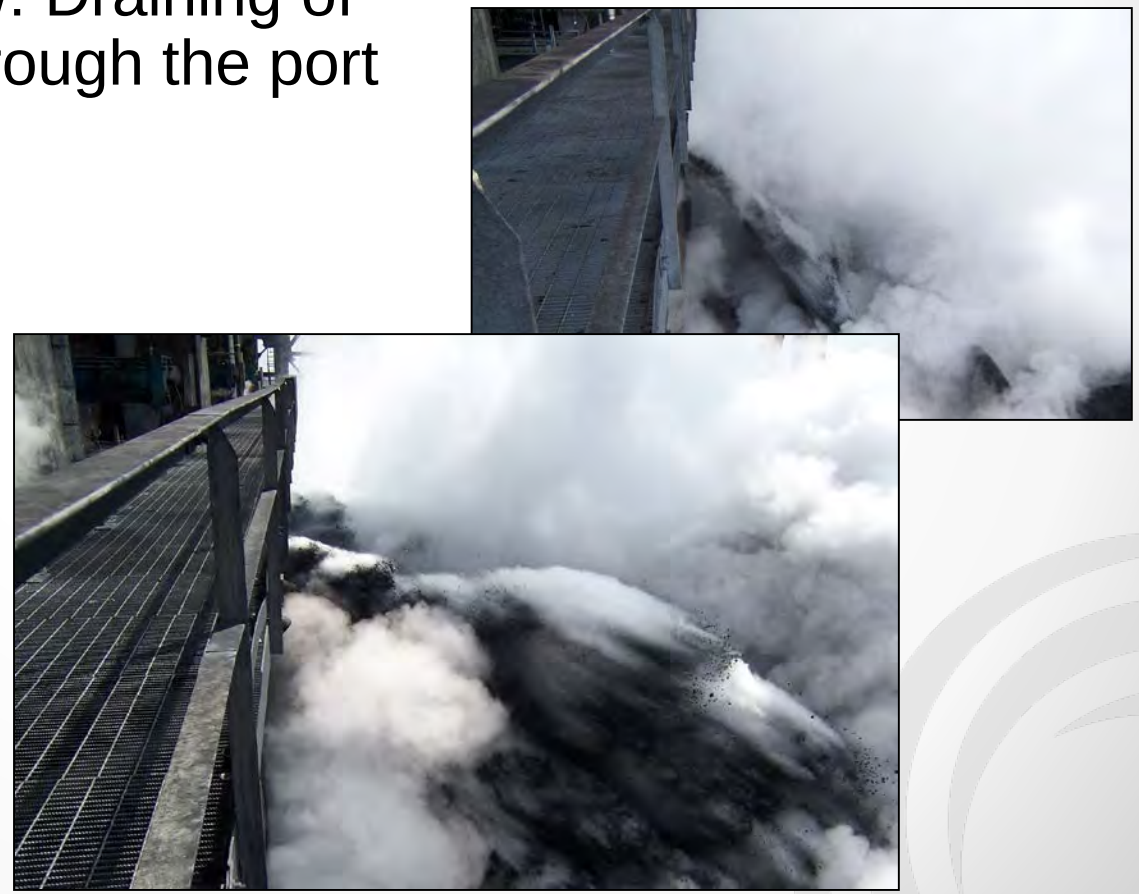
Bottom Unheading Valve Installation



DeltaValve Coke Drum Unheading

Increased Throughput

- Unheading or reheading time of 2 - 4 minutes
- For maximum throughput, the unheading valve is configured to allow: Draining of coke and water through the port



DeltaValve Coke Drum Unheading

Low Maintenance Costs

- Quick assembly and disassembly with coke drum
- Minimal part requirements for complete seat and seal replacement
- Re-buildable on switch deck during shutdowns

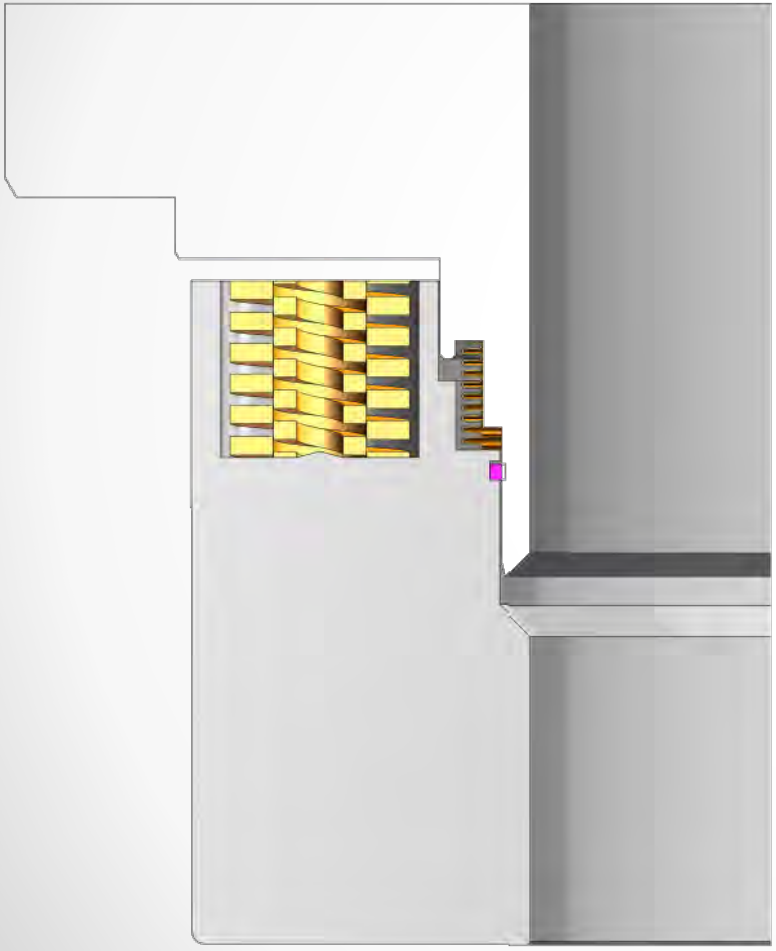
DeltaValve Coke Drum Unheading

Latest Technological Advances - GV825 Bottom Unheading Valve

- Ultra low steam consumption
- Body is fully isolated from solids
- Valve body remains fully pressurized during stroke
- No cooling box/water
- Hydraulic or electric actuation options

DeltaValve Coke Drum Unheading

Latest Technological Advances – Ultra Low Steam Consumption

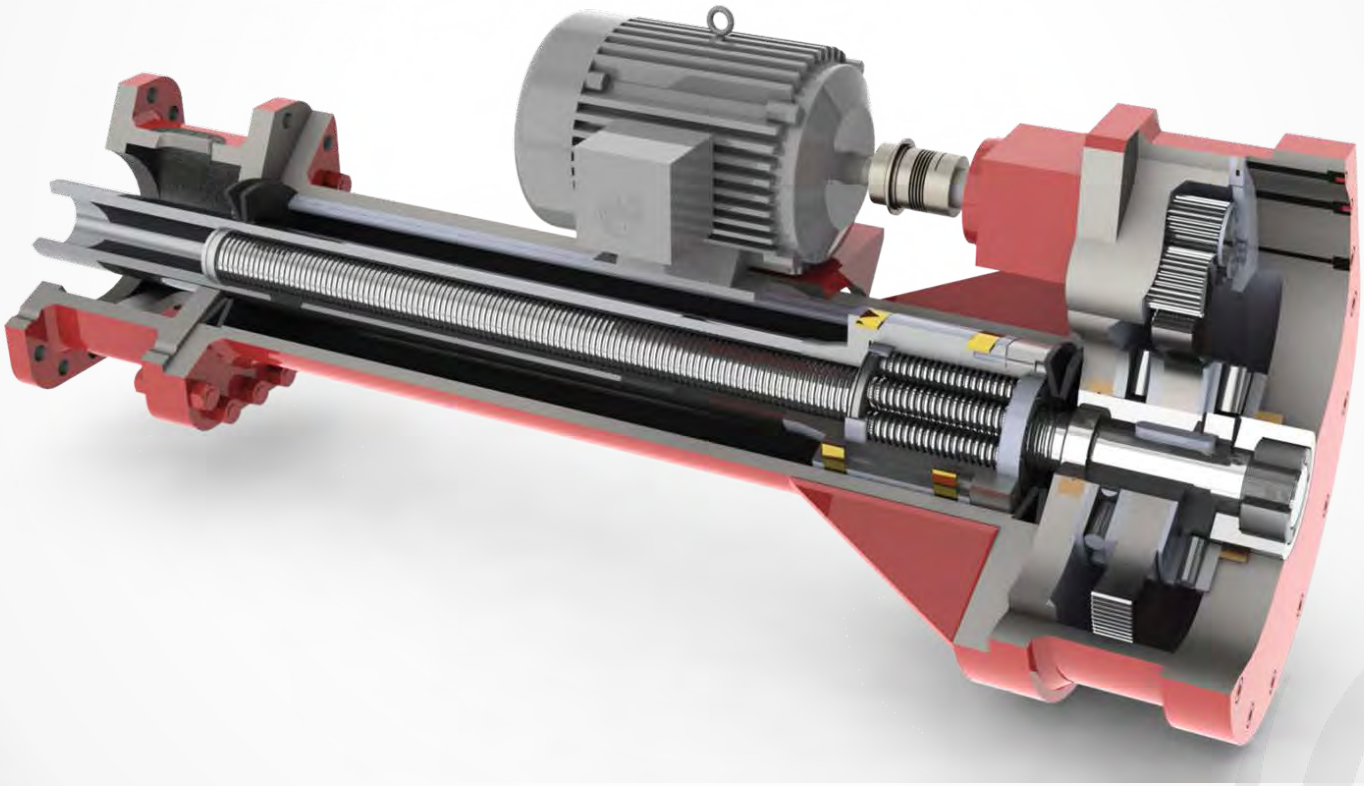


Original Seating

New Seating

DeltaValve Coke Drum Unheading

Latest Technological Advances – Electric Actuation



DeltaValve Coke Drum Unheading

Latest Technological Advances – Electric Actuation

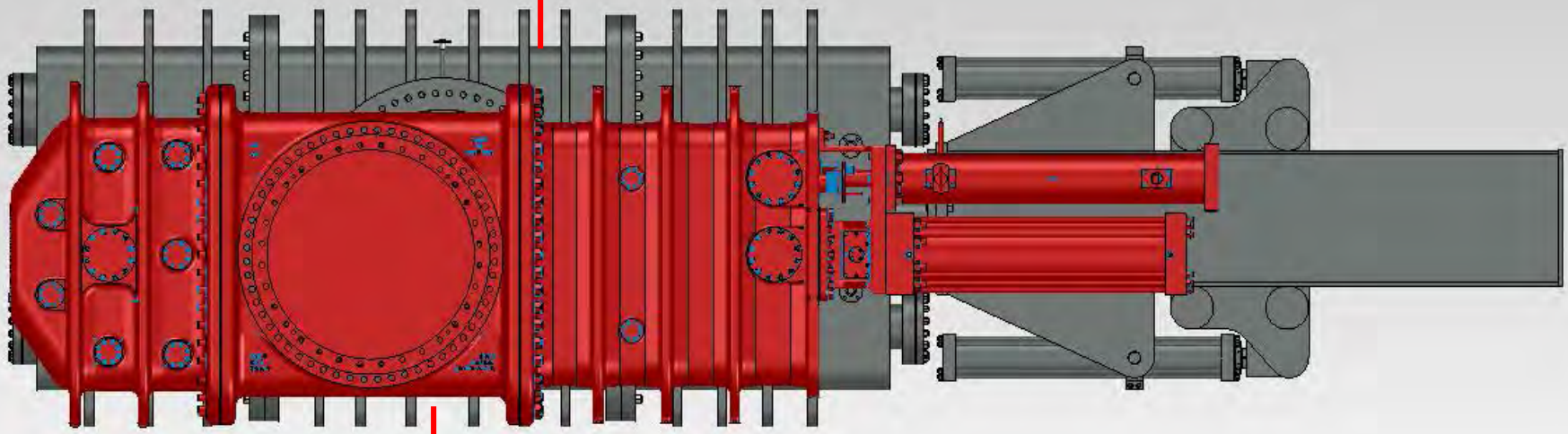
- Unheading valve actuator comparisons

Types of Operators			
	Planetary Roller Screw	**Hydraulics**	**Acme screw**
Load capacity	Very high	Very high	Very high
Lifetime	Very high	Very long	Short/
Speed	Very high	High	Low
Acceleration	Very high	Very high	Low
Stiffness	Very high	Very high	Very High
Shock resistance	High	Very High	Very High
Efficiency	>80%	Moderate <50%	Very low (<40%)
Maintenance	Very low	Very High	High
Installation	Very easy	Complex	Very Easy
Position control	Very easy	Complex	Moderate
Position accuracy	Very high	Moderate	Moderate
Environmental concerns	Low	High	Low

Unheading Valve Comparison

Hydraulic Actuation

Competitor unheading valve

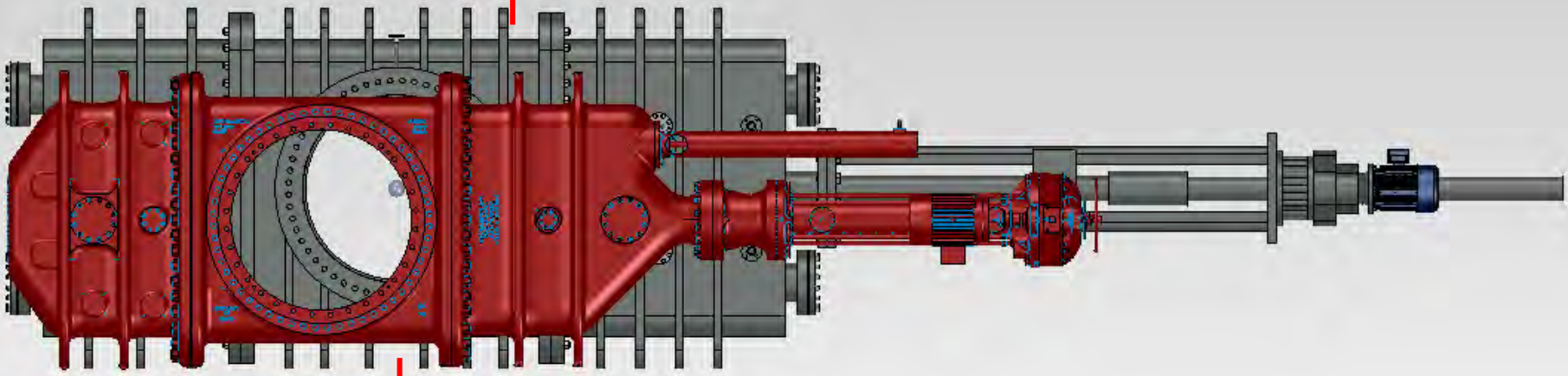


DeltaValve unheading valve

Unheading Valve Comparison

Electric Actuation

Competitor unheading valve



DeltaValve unheading valve

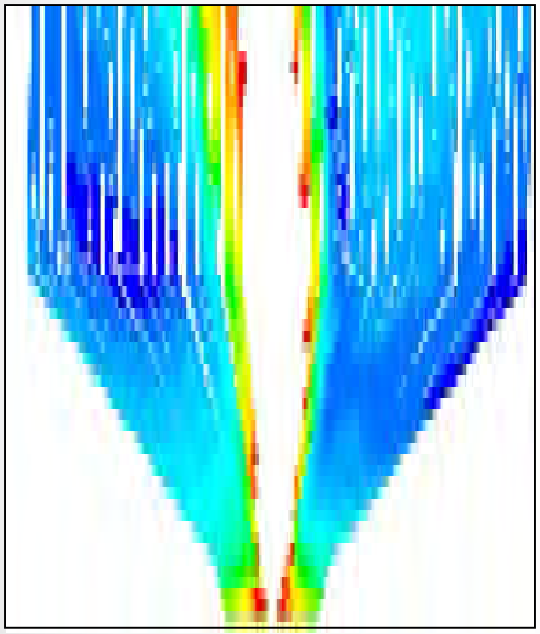
DeltaValve Center Feed Technology

Why the Need for Retractable Center Feed?

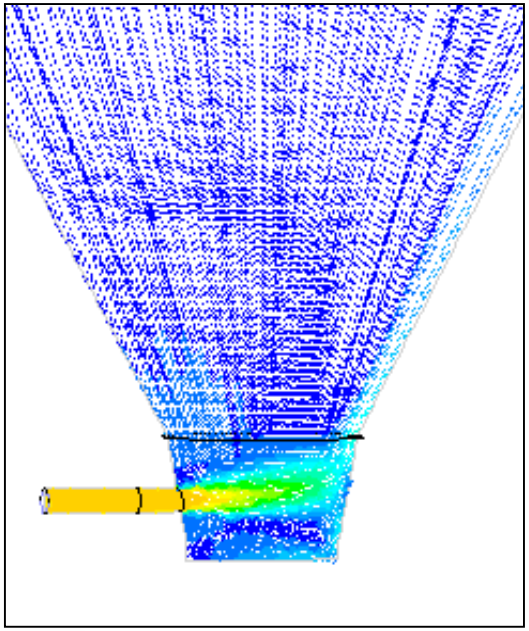
- Common concerns with side-feed entry:
  - Opposing coke drum wall opposite side-feed entry experiences extreme thermal stresses
  - Resid flow patterns tend to migrate up the drum wall rather than up the center, causing thermal stresses to the coke drum during feed and quench possibly causing coke drum “banana effect”
  - “Banana effect” on coke drums can also result in damaged drum skirts and process safety risks
  - Potential increase in “hot spots” and top head blowouts when using side-feed

DeltaValve Center Feed Technology

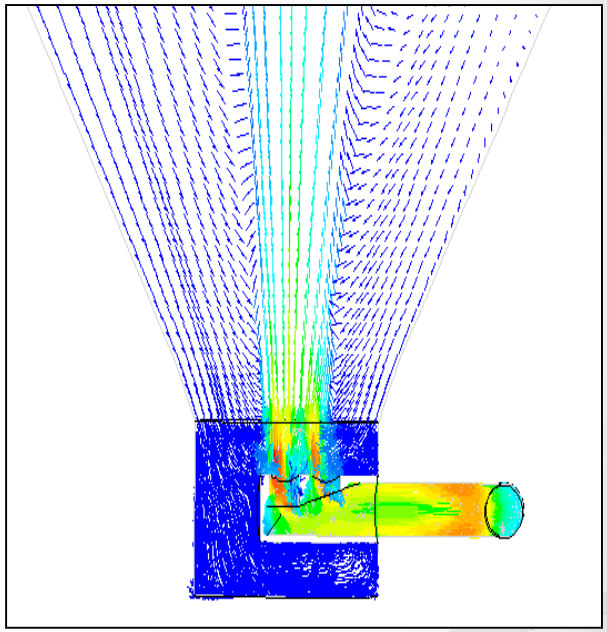
Center Feed Injection: Bottom Feed vs. Side Feed



Traditional Bottom Feed



Current Side Feed



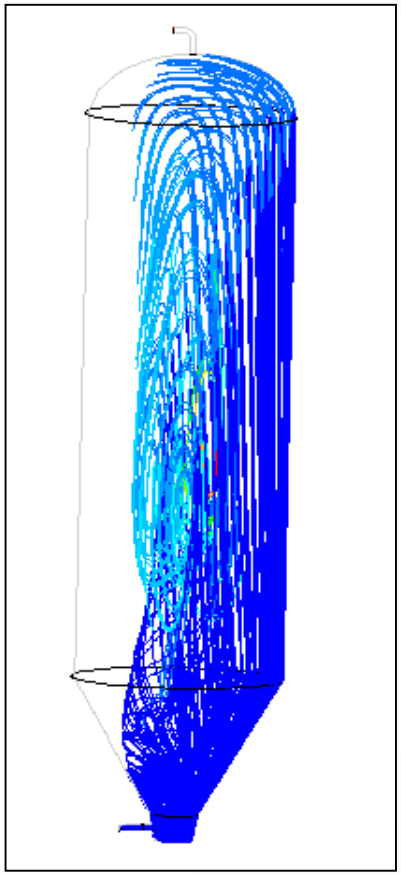
Retractable Center Feed Injection

Data courtesy of
Stress Engineering Services

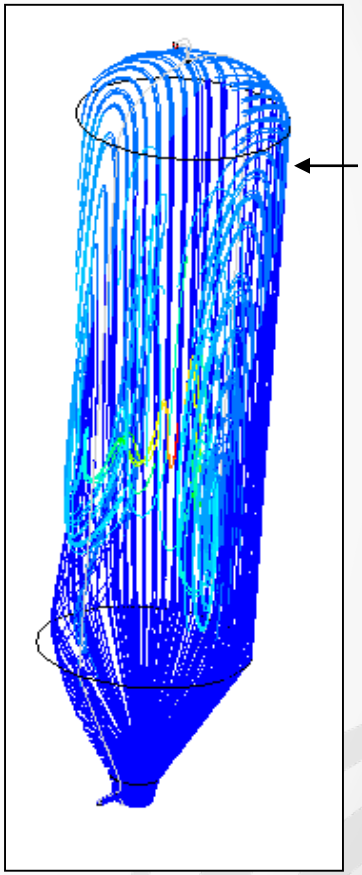
DeltaValve Center Feed Technology

Center Feed Injection: Bottom Feed vs. Side Feed

- The simulations represent the beginning of the coking process when VRC vapor is injected into an empty drum
- The analysis and path lines shows that the flow impinges upon the drum wall. The impingement causes the flow to disperse partially around the circumference of the drum; the flow then rises vertically upwards along the walls of the drum.



Path lines of flow originating at the inlet



Alternate view

Data courtesy of
Stress Engineering Services

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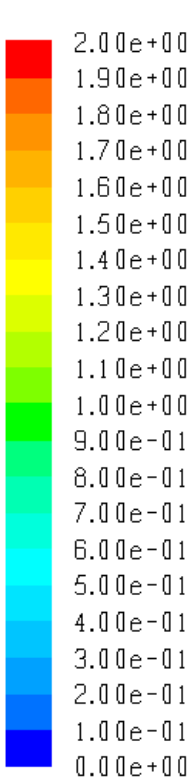
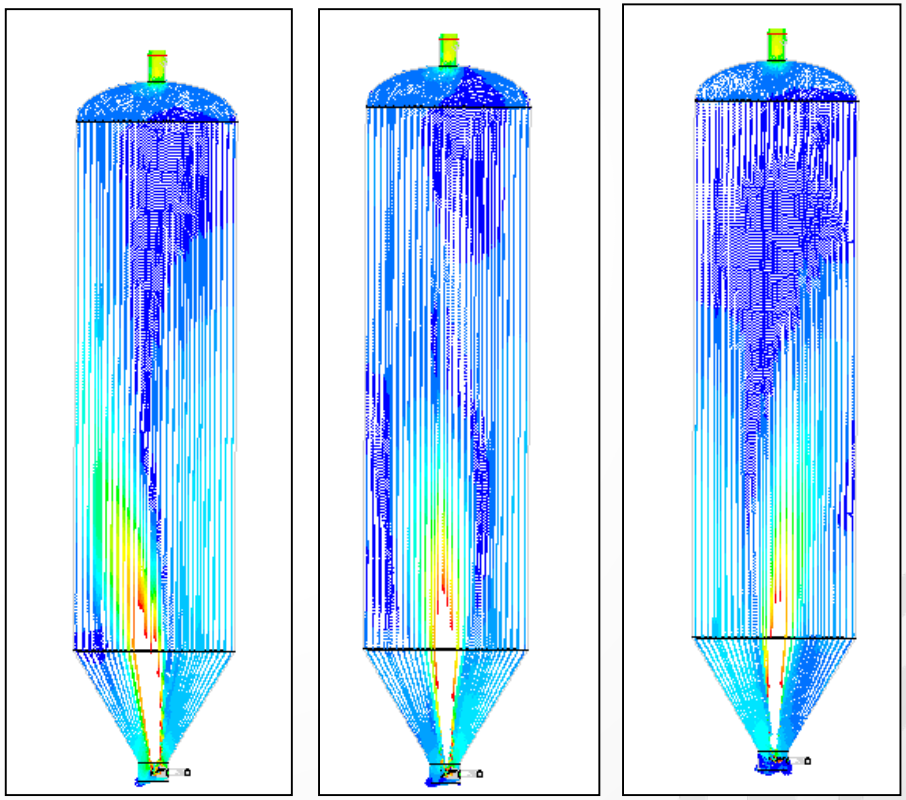
Center Feed Injection: Bottom Feed vs. Side Feed - Results

- Unsteady flow analysis
  - The simulations represent the beginning of the coking process when VRC is injected into an empty drum



Velocity (m/s)
Red color denotes velocity of 2 m/s and the white areas next to red denotes regions of velocity higher than 2 m/s



Velocity distribution at different time instants (indicating oscillation of plume)

Data courtesy of
Stress Engineering Services

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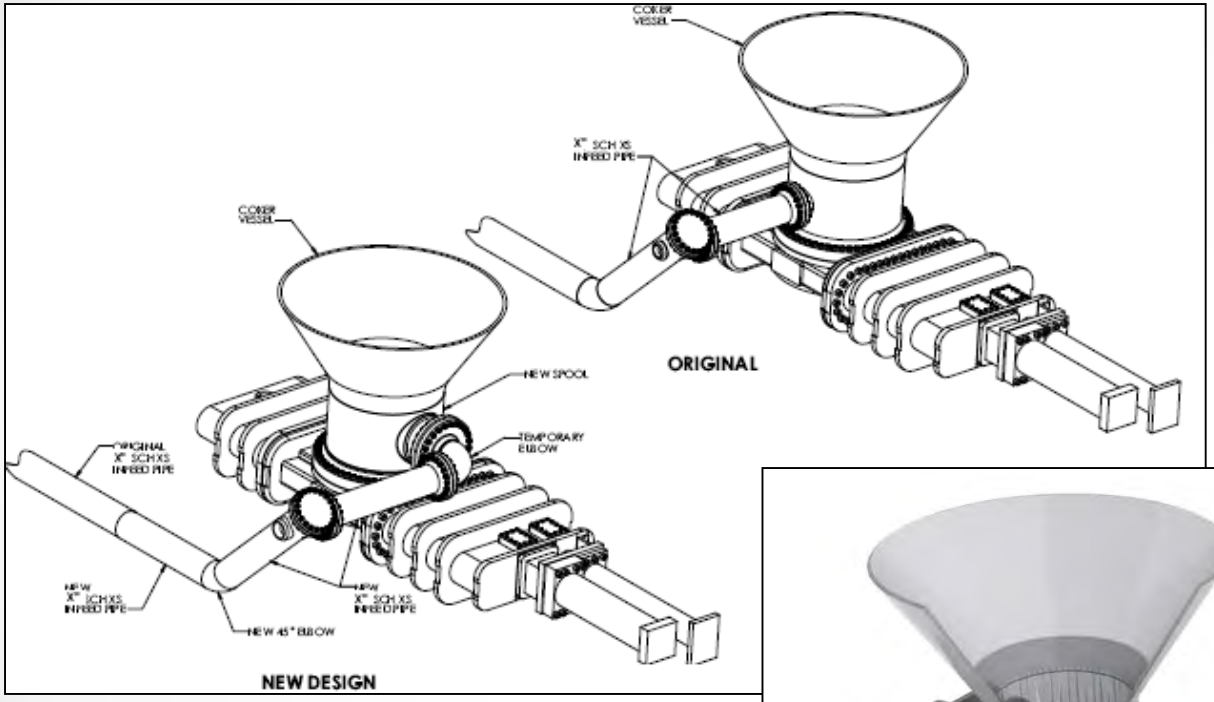
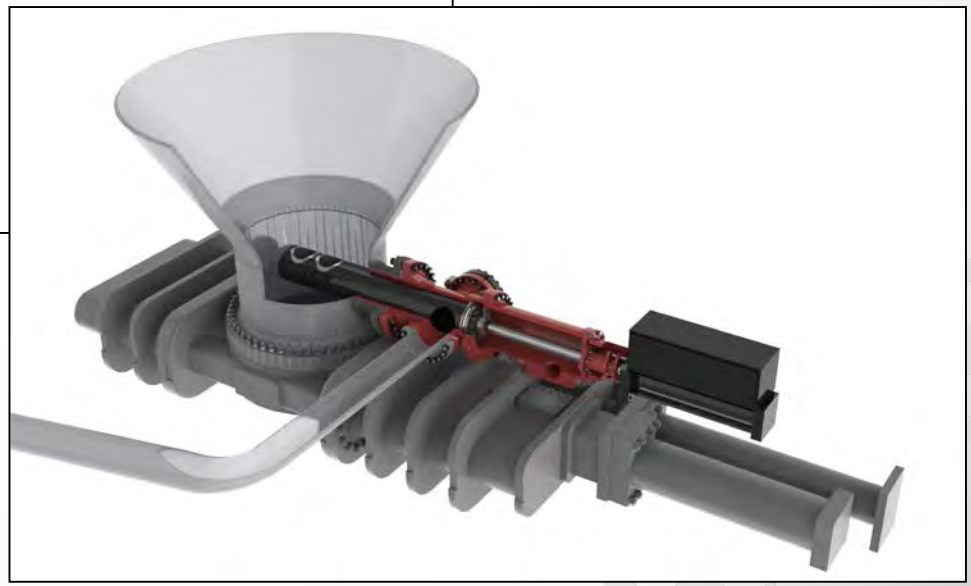
Retractable Center Feed Injection





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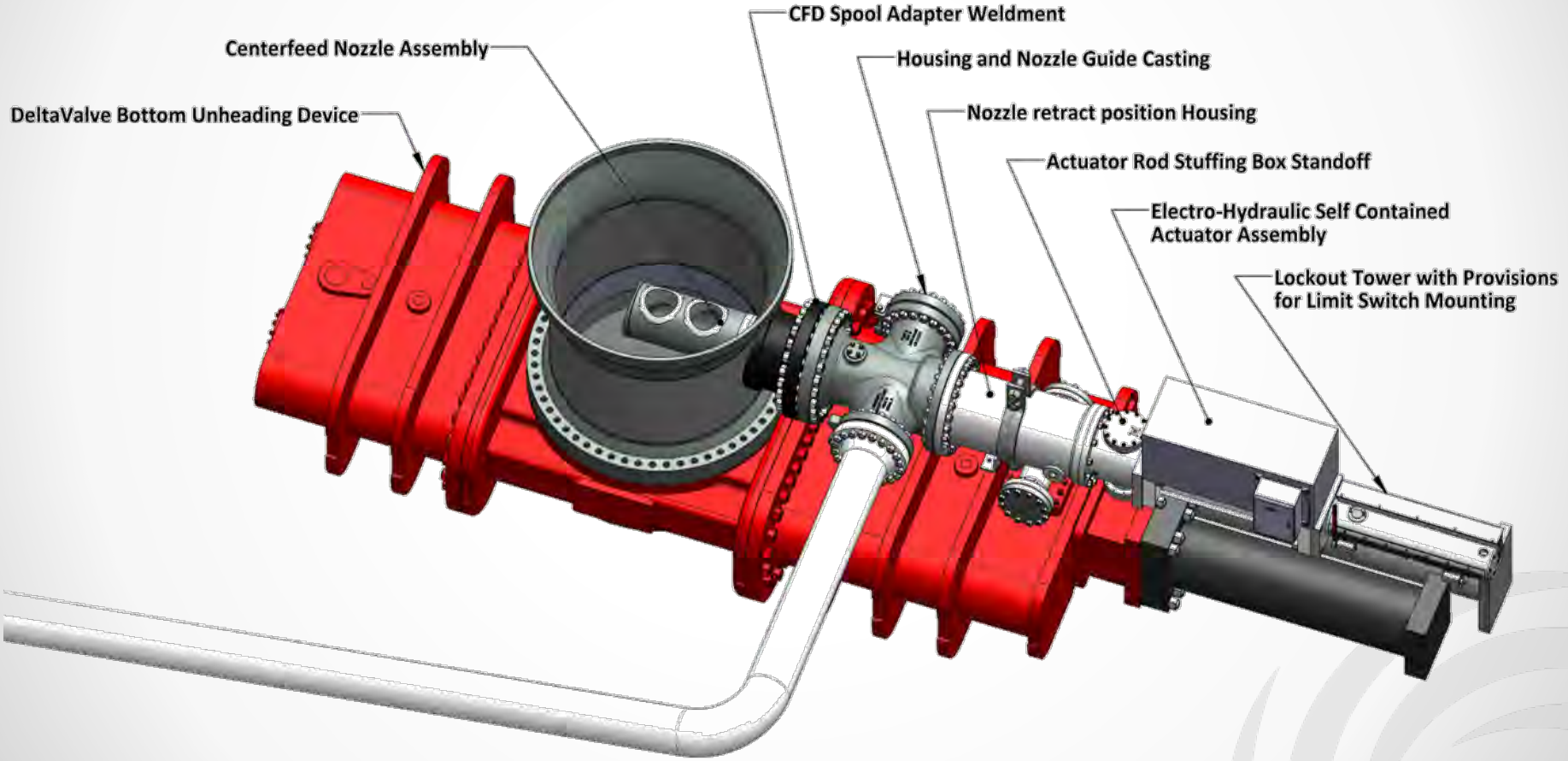
Retractable Center Feed Injection



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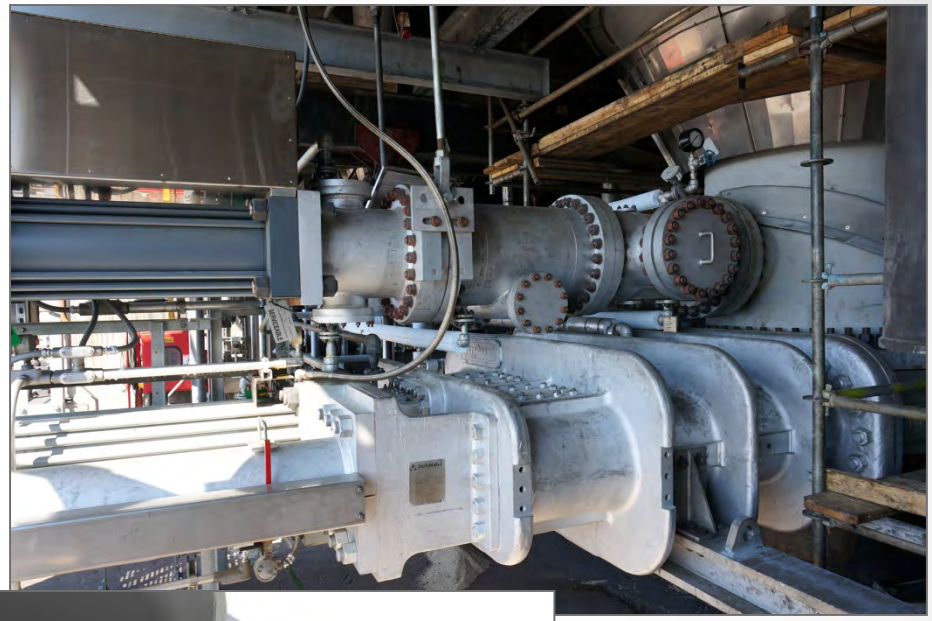
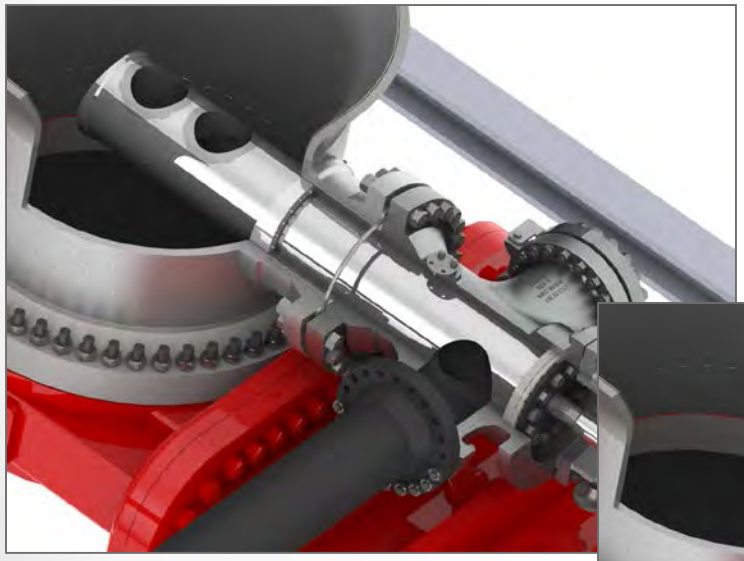
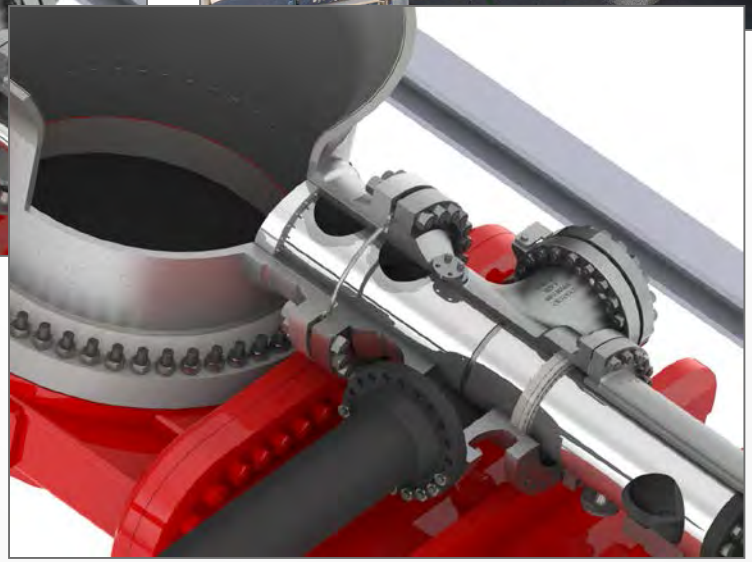
Retractable Center Feed Injection







DeltaValve Center Feed Technology

Retractable Center Feed Injection

- Nozzle configuration produces a centered feed stream
- Better thermal distribution during feed may result in
  - Maximized coke-drum life and minimized down-time and repairs
  - Minimized pressure spikes during quench cycle
  - Improved top head safety by minimizing blowouts and geysers
  - Reduced local hot-spots
  - With nozzle retracted, no flush water required to keep feed line clear during cutting
- Prototype unit working since October 2011 without any production loss
- 4 units installed and operating
- 3 units in production
- Numerous orders pending

Questions/Comments