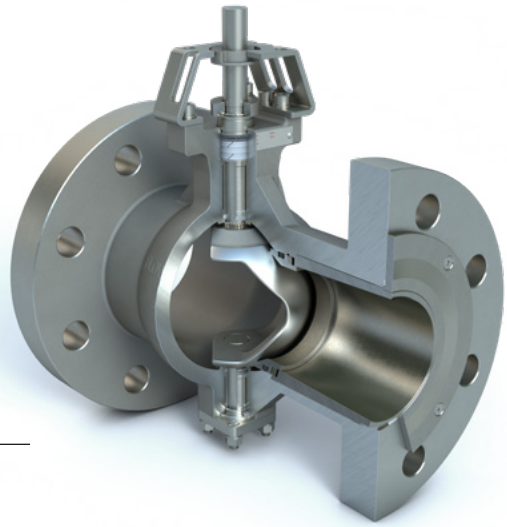
Control Valve Solution Improves Service Life in Refinery Slurry Application

KEY RESULTS

- Technical solutions mitigated impact of slurry erosion.
- Extended useful valve service life significantly.
- Eliminated costly shutdowns required to replace failing control valves.
- Bray S19L solution became customer's new standard specification for FCC slurry control applications.
- Estimated savings of $336,605 per valve, over 4 years.



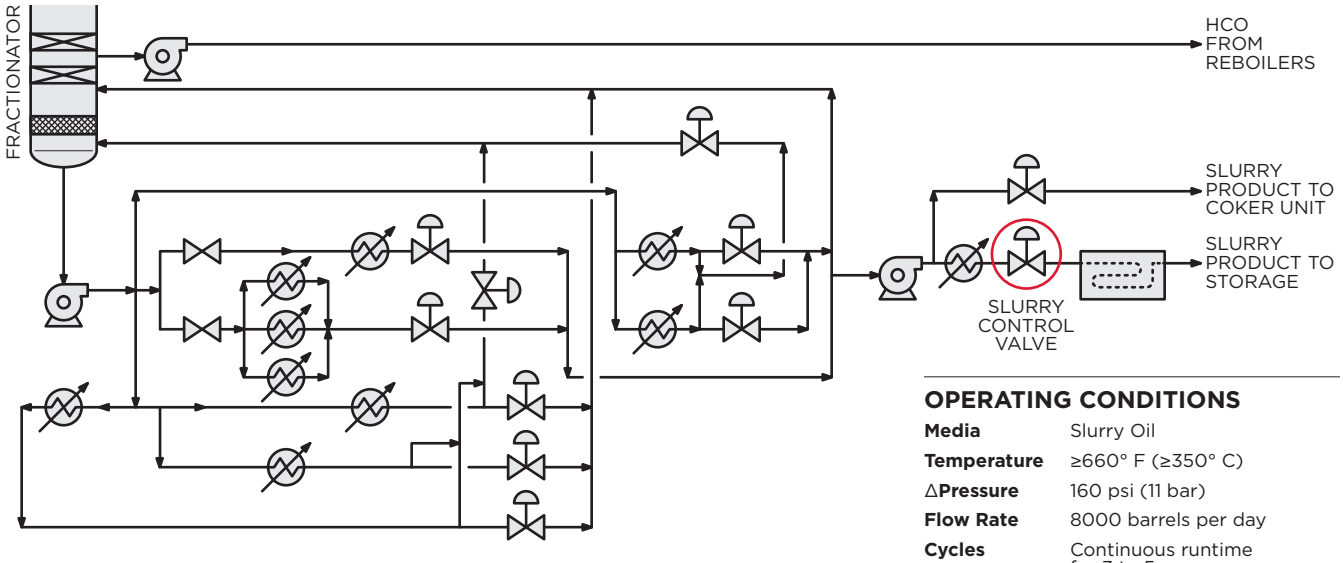
The Flow-Tek S19L Segmented Ball Control Valve was customized for the FCC slurry control application.

APPLICATION

Slurry control for Fluid Catalytic Cracking (FCC) unit at a major refinery in southeast Texas.

The FCC unit is one of the key process units in most petroleum refineries, converting low-value, heavy hydrocarbons into lighter weight, value-added petroleum products. High temperatures and fluidized, fine catalyst combine to create a highly abrasive and erosive media.

TYPICAL FLUID CATALTIC CRACKING (FCC) APPLICATION



OPERATING CONDITIONS

Media	Slurry Oil
Temperature	≥660° F (≥350° C)
ΔPressure	160 psi (11 bar)
Flow Rate	8000 barrels per day
Cycles	Continuous runtime for 3 to 5 years.

CHALLENGE

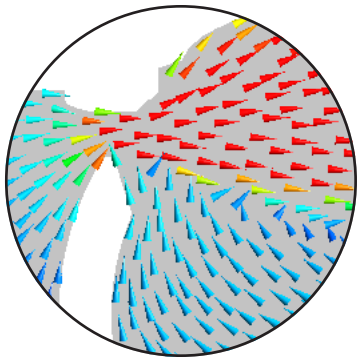
Ideally, the FCC unit runs continuously for 3 to 5 years between scheduled shutdowns for routine maintenance. However, a competitor's slurry control valve was failing frequently, due to erosion from the abrasive media. The failures, occuring at approximately 4-month intervals, were costly — requiring unscheduled shutdowns and valve replacement each time.

SOLUTION

The Bray Technology Group researched the problem, using Computational Fluid Dynamics (CFD) to simulate the flow of the failed valves and the probable effects of the proposed solution.

After analysis, Bray recommended the Flow-Tek Series 19L Segmented Ball Control Valve, with several modifications to enhance the lifespan of the valve.

1. Characterize the ball segment for improved process control, minimizing high velocity and cavitation.
2. Reverse the flow direction to minimize erosion on the valve wall and face of the ball segment.
3. Install a replaceable liner downstream to increase abrasion resistance.
4. Add proprietary surface coatings to further increase abrasion resistance.

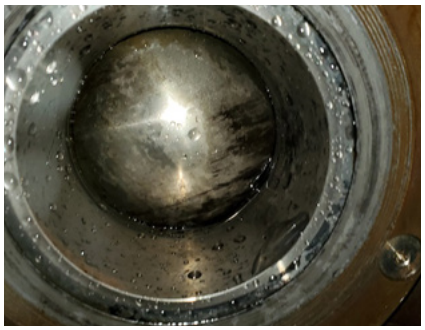


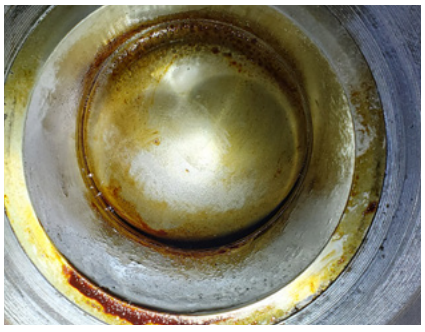
CFD analysis simulates the flow of the failed valves and proposed solutions.

RESULTS

The customer installed the proposed valve, with reversed flow direction per Bray's recommendation, and saw dramatic improvements in performance.

- All inspections, scheduled at 3-month intervals, continue to reveal **minimal signs of abrasion**, allowing the valve to return to service each time.
- After one year in service, the Bray valve has already **tripled the lifespan** of the previous valves, with an **expected service life of up to four years**.
- **Eliminated costly shutdowns** for frequent valve replacement.
- Based on outstanding results, the **S19L** design solution became the customer's new **standard specification** for FCC slurry control applications.





These images show minimal signs of abrasion to ball segment after 90 days (top) and 180 days (bottom). After each inspection, the valve returned to service.

ESTIMATED TOTAL SAVINGS PER VALVE

TOTAL COST OF OWNERSHIP	COMPETITOR	BRAY
Annual removal cost (every 4 months)	$17,580 (3 x $5860)	—
Annual installation costs (every 4 months)	$18,360 (3 x $6120)	$23,155 (One Time)
Annual replacement cost (every 4 months)	$54,000 (3 x $17,000)	—
Total Maintenance Costs for 1 Year	$89,940	—
Total Costs for 4 Year Lifespan	$359,760	$23,155
Estimated Total Savings for 4 Years		**$336,605**

Note:
Overall savings does not include values for operating expenses and reclaimed production.

Bray takes pride in their unique ability to rapidly deploy resources — delivering customized solutions for our customers' toughest applications. To learn more about our full line of flow control solutions, visit BRAY.com