Knife Gate Valves Greatly Improve Productivity in Coal Mining Cyclone Application

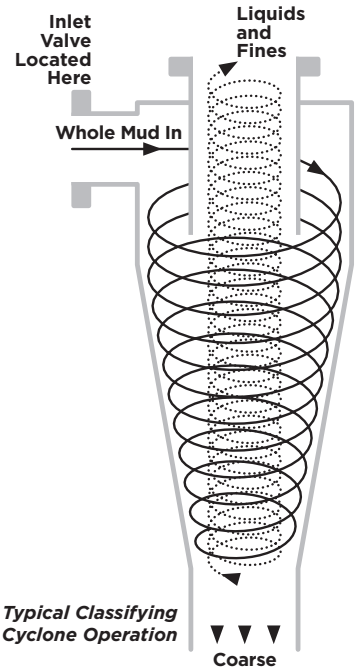
Series 768 Knife Gate Valve featuring SlurryShield technology.

APPLICATION

Classifying cyclone process for a leading coal mining operation in NSW Australia.

Classifying cyclones use centrifugal force to accelerate the settling rate of slurry solids, resulting in particle separation according to size, shape, and specific gravity. Coarse solids are discharged to spirals, screens, or the dewatering process, while coal fines are discharged to flotation or the thickener for separation.

Coal mining operations typically require several cyclone distribution modules, with multiple cyclones and knife gate valves used for each. In large operations, there could be 60 or more cyclones and related valves.



Typical Classifying Cyclone Operation

CHALLENGE

A routine six-month shutdown inspection revealed significant problems with several of the existing unidirectional knife gate valves, including:

- Deflector cone was not seating correctly, resulting in restricted flow and media buildup.
- Visible breakage and media buildup in the seat area.
- Visible distortion in the gate, presumably caused by back pressure.
- Visible gate scoring.
- Restricted media flow, due to reduced port valve.
- Loss of product during slurry watering, with inefficient cyclone operation.

These issues were causing inefficient cyclone operation, resulting in decreased production with increased downtime and associated contractor costs.

These images show significant signs of damage to existing unidirectional knife gate valves.

SOLUTION

Based on an existing relationship as a trusted partner, Bray was given an opportunity to suggest a better application-specific solution. For evaluation, Bray application engineers recommended the Series 768 bidirectional Knife Gate Valve with SlurryShield® technology, operated by a double-acting pneumatic actuator.

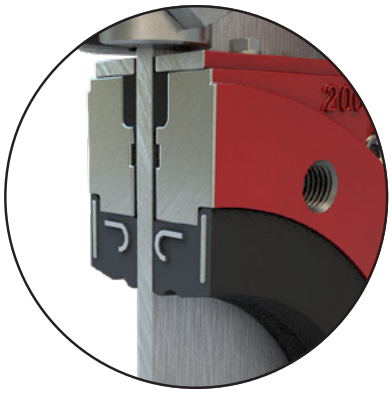
Several exclusive **SlurryShield®** technology features would make this valve an optimal choice for this application:

- Superior Elastomer Sleeve Performance
  - Unique energized sleeve design provides rapid rebound, assuring positive isolation and minimizing atmospheric discharge in cycle.
- Self-Cleaning/Self-Purging Technology
  - Designed to dispel dense solids and heavy slurry from the valve body and flow path as the valve cycles, while eliminating cavities and pockets that could cause jamming.
- Enhanced Cycle Life Performance
  - Energized sleeve design minimizes compression on the sleeves in the close position, while offering responsive rebound as the gate cycles open — delivering maximum performance in sleeve cycle life, premium run-time, and lower cost of ownership.

In addition, the Series 768 bidirectional valve uses a full port design, which provides an increased media flow rate, while the field serviceability ensures a long lifespan to minimize operating costs.

BRAY PRODUCT DETAILS

Valve	Series 768 Bidirectional Knife Gate Slurry Valve
Body Style	Two-piece Bolted Wafer
Size	NPS 6 | DN 150
Pressure Class	Up to 150 psi | Up to 10 bar
Body Material	Ductile Iron S30-36 ASTM A536 Gr. 65-45-12
Gate Material	316 Stainless Steel
Stem Material	304 Stainless Steel
Sleeve Material	Customized for purpose
Actuator	Pneumatic Double-acting



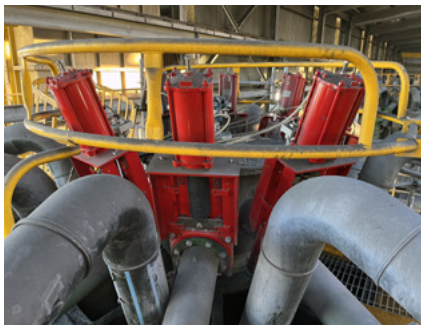
Exclusive SlurryShield® technology.

RESULTS

Eight SlurryShield® knife gate valves were installed for evaluation on a cyclone distribution module. After six months of operation, inspection showed the Bray trial valves and actuators had performed extremely well, and returned to operation with no service required.

The Bray Series 768 bidirectional knife gate valves provided several end user benefits, including:

- Eliminated loss of product during operation.
- Eliminated gate scoring and distortion (caused by back pressure).
- Eliminated downtime for valve replacement and associated costs.
- Increased media flow to full port size by eliminating catch points.
- Increased uptime of classifying cyclones application.
- Extended service life over existing valves.
- Greatly increased mine productivity and profitability.



After 6 months of operation, these Bray Series 768 Knife Gate Valves required no service, and returned to continuous duty.

UPDATE

The impressive results and consistency of the Bray trial valves led the customer to enquire about supplying valves for an additional 4 primary feed cyclone modules — replacing all remaining (32) unidirectional knife gate valves.

For more information about flow control solutions for mining and slurries, contact your local representative or visit Bray.com.