Knifegate Valve Extends Service Life up to 600% for Hydrocyclone Application

APPLICATION

Hydrocyclone milling process in a large copper mine located in Chile.

In metal mining operations, hydrocyclones are used to separate suspended solids from liquids, for further processing. The thick copper slurry feeds the hydrocyclone, which uses centrifugal movement to sort solids into two pre-determined sizes. The coarse particles (underflow) exit the bottom, continuing for further grinding — while the finer particles (overflow) exit the top, along with most of the fluid. Large mining operations can require multiple hydrocyclones, with each employing up to 12 knife gate valves for feed control of the abrasive media.

CHALLENGE

For two years, this copper mine had been using a competitor's knife gate valves in the feed lines to the hydrocyclone milling process. They were experiencing valve failures every 4 to 6 weeks, losing product through slurry watering, and requiring complete valve replacement each time. With 60 valves required for the process throughout the operation, the associated downtime and replacement costs were severely affecting profitability. The customer needed robust and durable valves to handle the demanding copper slurry and optimize the hydrocyclone operation.

SOLUTION

Bray engineers recommended a heavy-duty Series 762 bidirectional Knife Gate Valve (size NPS 10 | DN 250) with a double-acting pneumatic actuator. The robust knife gate valve uses SLURRYSHIELD® technology — a proprietary molding process with encapsulated J-rings — to improve elasticity and minimize discharge as the gate opens. The pneumatic actuator takes advantage of the existing air supply to provide reliable operation for high cycles.

Customer regulations required six-month intervals for service, so a six-month trial period was established to compare two Bray S762 valves against the existing knife gate valves. The Bray valves provided reliable service without failure for the entire **six-month period**, while the existing valves continued to fail at 4 to 6 week intervals — with associated costs of **more than $53,000 USD** each time.

RESULTS

The impressive results of the Bray test valves led the customer to schedule replacement of all their knife gate valves as each one failed — for a **total of 60 valves** for the entire hydrocyclone process. As each Bray valve was installed, the customer saw these additional benefits:

- Service life extended up to 600% over existing valves.
- Uptime of hydrocyclone application was greatly increased.
- Loss of product was eliminated.
- Downtime for valve replacement and associated costs were eliminated.
- Profitability was significantly increased.

PROCESS CONDITIONS

Application	Hydrocyclone feed
Media	Copper slurry
Solids Ratio	45%
Solids Size	1 inch | 25mm
Pressure	25 psi | 1.72 bar
Temperature	59°F | 15°C
Cycles	60 cycles per day
Flow	6670 to 7837 yd^3/h 5100 to 5992 m^3/h

BRAY PRODUCT DETAILS

Valve	Series 762 Bidirectional Knife Gate Valve
Size	NPS 10 | DN 250
Pressure Rating	100 psi | 7 bar
Body Style	2-piece bolted | Flanged
Actuation	Pneumatic (double-acting)

Bray Series 762 SLURRYSHIELD® knife gate valves with double-acting actuator provided 6X the service life of competitor valves.