

# M1 Severe Service Ball Valve Extends Service Life 4 Years in HPAL Autoclave Isolation

## KEY RESULTS

- > M1 Severe Service Ball Valve was “engineered to order” for specific operating conditions.
- > Valve service life was extended from 1 year to 4+ years.
- > Customer saved **\$400,000+ USD** per valve.



## CUSTOMER

Major nickel mining and processing plant in Southeast Asia.

## APPLICATION

### High-Pressure Acid Leaching (HPAL) Autoclave Feed Pump Isolation

Hydrometallurgical processing plants utilize an HPAL process to recover Nickel, Cobalt, and other valuable minerals from limonitic ores with high iron content. The iron ore is crushed, screened, and fed into an autoclave, where sulfuric acid leaching is performed at high temperatures. The mixed nickel-cobalt sulfide media being transported is a hot slurry product, containing fine solid particles that are extremely abrasive and erosive to valve internals.

The isolation valves used for the autoclave feed pump are exposed to extreme environments with operating parameters that include high solid particle concentration, with frequent cycling continuously throughout the 9 to 12 month campaign interval.

## CHALLENGE

In this application, competitor valves were requiring replacement following each campaign interval (9 to 12 months) — leading to excessive maintenance costs for all the feed pump isolation valves. The customer needed valves to reliably meet the demands of this punishing application, which included:

- > High-temperature slurry, with a density of 25% to 35% solids.
- > Presence of sulfuric acid.
- > High-cycle, tight shutoff for uninterrupted campaign intervals of 9 to 12 months.
- > Seat tightness per ANSI/FCI 70-2 Class VI.

## PROCESS CONDITIONS

<b>Industry</b>	Mining (Nickel Ore).
<b>Process</b>	Hydrometallurgical Nickel Processing Plant.
<b>Application</b>	Slurry Transport; High-Pressure Acid Leaching (HPAL) Autoclave Feed Pump Isolation – Recovery of Nickel & Cobalt from saprolite & limonite ores.
<b>Media</b>	Mixed Nickel-Cobalt Sulfide (Slurry with 25% to 35% solids).
<b>Operating Pressure</b>	250 psig 17 bar
<b>Operating Temperature</b>	302°F 150°C
<b>Cycling Requirements</b>	Every 30 to 90 minutes, continuously for 9 to 12 month campaign.

> *To learn more about Bray's solution, continue reading on page 2.*

## CUSTOMER SUCCESS

### SOLUTION

After analyzing the situation, Bray recommended a severe service ball valve “engineered to order” for the specific operating conditions of the HPAL Autoclave Feed Pump Isolation application. The valve included the following specifications:

- > M1-R100 Severe Service Ball Valve (NPS 10 | DN250).
- > ASME Class 300 (PN 25, 40).
- > Titanium ball and seats.
- > High-temperature, abrasion resistant coating.

As part of an agreed field trial, the valve would be installed for 6 months before removal for inspection.

### RESULTS

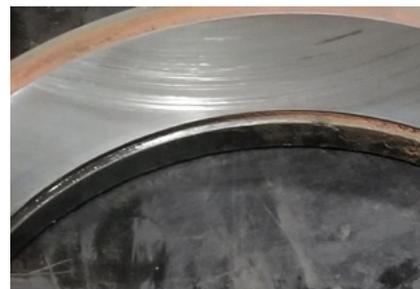
During inspection, the internal components showed minimal wear, and appeared to be satisfactory for sealing and operation. There was no evidence of permanent deformation, and the excellent condition of the coating, as well as float of the seat, indicated that the M1-R100 design was appropriate for the application. The trim coating showed no signs of corrosion, and no significant wear from the service — indicating that it was the appropriate coating for the application. It was determined that the valve would have continued to function as intended, had it not been removed for inspection as part of the field trial. No design or material changes were required.

The valve was refurbished to like-new conditions, and returned to site for reinstallation. Over the next 45 months (3 campaign seasons), the valve was periodically inspected and seat-tested during scheduled annual facility shutdowns. The customer found no issues with valve performance during this time.

Five years after the initial installation, Bray recommended removing the valve during the next scheduled shutdown, for a preventative refurbishment — even though it was not leaking beyond the customer’s acceptable parameters. Upon receipt at the Bray facility, the M1 inspection found minimal wear to the sealing components — and only minor material displacement at the stem-to-ball interface, caused by trapped line debris and high-volume cycling. The stem was replaced, and all other components were refurbished. The valve was reassembled, tested, and returned to the customer’s site for reinstallation.

### BRAY PRODUCT DETAILS

<b>Valve</b>	M1 Severe Service Ball Valve
<b>Size</b>	NPS 10   DN250
<b>Pressure Class</b>	ASME 300   PN 25, 40
<b>Materials</b>	Body: Titanium Ball: Coated Titanium Stem: Titanium Seats: Coated Titanium Packing: Graphite
<b>Modifications or Upgrades</b>	Titanium trim with high-temperature, abrasion resistant coating.
<b>Actuator</b>	Electro-Hydraulic (by others)



**After 5 years of service, the ball and seats showed only minor scratches, and were refurbished for continued service.**

### CUSTOMER BENEFITS

With the Bray M1-R100, the service life for the HPAL Autoclave Feed Pump Isolation valve was **increased by 4 years**, or 4 complete campaign intervals — saving the customer an estimated total of **\$400,000 USD** per valve (not including the labor to remove and reinstall new valves each interval).

For information on the M1 valve, or our full line of flow control solutions, visit [BRAY.com](https://www.bray.com)