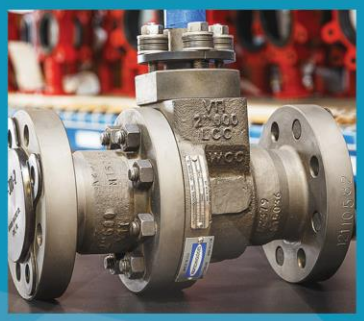
Severe Service Valve Solves Complex Problem at PotashCorp



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The World's Best Valves®

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Table of Contents

I. **Background** 2
II. **The Problem** 2
III. **The Solution** 3
IV. **Conclusion** 4

Background

Located 15km Southwest of Saskatoon, the Cory Division of PotashCorp is one of the world's largest producers of potash, phosphate, and nitrogen products – the primary nutrients involved in producing healthy crops. Potash is referred to as the 'quality nutrient' because of its impact on taste, texture, and nutritional value of a wide variety of plants.

PotashCorp's Cory Division – 15km Southwest of Saskatoon, Saskatchewan

As potash is typically found 1-3 kilometers underground, large positive displacement pumps are needed to pump the mine inflow to the surface. At the Cory Division, this inflow is a liquid composed of potash brine and wash water; the density varies depending on the concentration of the brine.

The Problem

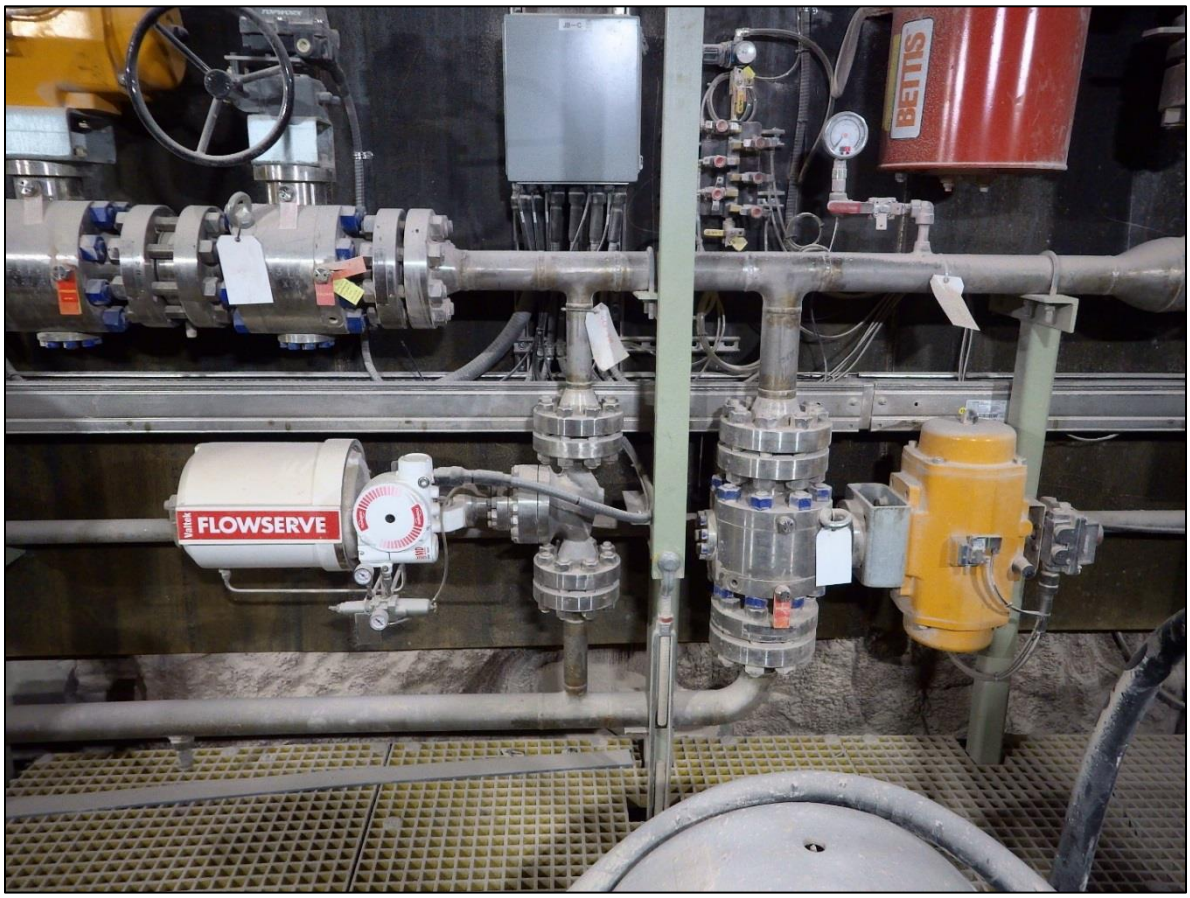
PotashCorp needed to automate a positive displacement pumping system which would require a control valve to operate at a continuous high pressure differential. The discharge piping in their mine rises over 1000 meters to the surface, so the operating pressure can vary significantly based on the density of the liquid pumped.

The positive displacement pumps are required to start under minimal load, which is achieved using a bypass valve back to the storage tank. Once the pumps reach full speed, the control valve slowly closes, increasing pump discharge pressure until flow is pumped through the discharge line to the surface. The valve is also dual-purpose; it serves as a drain valve for the vertical riser to control flow when draining the pipeline.

In summary, PotashCorp required a valve which could handle high pressure differential, was rugged enough to provide a long service life, and was able to handle media with solids present. This combination of complex requirements and severe service applications led PotashCorp to CGIS – a global supplier of the highest performance valves, controls, and automation.

The Solution

After reviewing the application, CGIS recommended a Flowserve Multi-Z control valve with a three stage trim design. The Multi-Z is a cavitation preventative valve which divides the pressure drop into multiple pressure drop ratios. It has the same energy distribution on every single stage in order to eliminate cavitation on all stages to provide a long service life. The Multi-Z has a long stroke for better control performance, and the shaped notches in each stage are designed to handle large solids. The pneumatic actuator provided is a double acting piston design which increases thrust output and stiffness over a diaphragm design. The digital positioner is a Logix 3200MD with Pro Diagnostics, capable of providing self-diagnostics for the valve, actuator, positioner, and control range.



Flowserve's Multi-Z Control Valve in service at PotashCorp's Cory Division (Photo by DF)

Conclusion

The complexity involved in applications that require a Severe Service Valve cannot be underestimated. In this case, low maintenance costs, reduced downtime, and the longest service life possible all factored into the decision. By fully understanding the process, well before a dollar was spent, CGIS was able to provide the right valve for PotashCorp.