

Pipeline Efficiency

By (Author Name)

The Problem

AK Steel Corp., a steel mill in Ashland, Kentucky, was having a reoccurring problem at the quenching station. We were frequently replacing the conventional swing check valves installed in a vertical flow up application (Figure 1). In the quenching station, coke comes out of the oven at 1200°F and it is cooled with spray water. The water then drains into a pit where a pump recirculates the coke and water (approximately 2% concentration) 10 feet vertically through a swing check valve and into a cooling station where it is reused.

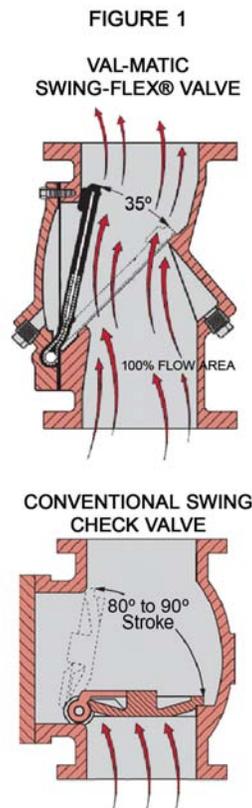


Figure 1

Once the pump is turned off and dewatering conditions occur, the coke fines settle on top of the valve disc. When the pump is turned back on, the valve disc will not fully open due to the additional weight of the coke fines. The result is reduced flow efficiency and increased headloss. In addition, the abrasive nature of the coke fines abraded the valve seat and body of the valve causing leakage and requiring frequent maintenance for the valve to seal properly.

The Options

The first swing check valve we installed at AK Steel clogged within days of use and/or backflushing with the seat leaking a few months after installation. Then we replaced the first valve with two different manufacturer's spring-loaded swing check valves. These replacement valves experienced the same results.

The Solution

Ohio State Representative of a company Val-Matic, suggested us to replace the existing swing check valve with a Val-Matic® Swing-Flex® Check Valve with Backflow Actuator (Figure 2). Val-Matic's simple design was the key here to the superior performance and long life of the Swing-Flex® Check Valve. The Conventional Swing Check Valve uses outside levers with weights or springs in an attempt to reduce slam, which pulls the disc down into the flow. Pulling the disc down into the flow creates high headloss and causes disc to flutter under flow conditions. As a result, the shaft, bearings, and shaft seal are subjected to severe wear and reduced service life. This wear caused by abrasion from the corrosive coke fines, explains why AK Steel had to replace their valves so often.



Figure 2

The Swing-Flex® Check Valve's clog resistant performance is achieved by maintaining an unobstructed 100% flow area, domed cover, and smooth streamlined body contour. Unlike a conventional horizontal swing check valve, the Swing-Flex® Check Valve has no packing or O-rings, mechanical hinges, shafts, pivots pins, or bearings to wear out.

VAL-MATIC SURGEBUSTER® VALVE

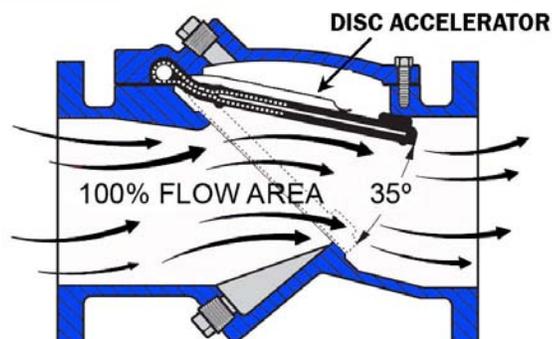


Figure 3

Reliability is achieved by utilizing just one moving part, the Memory-Flex™ disc. Extended life is designed into the disc by the inclusion of steel and nylon reinforcement. The steel and nylon are precision molded into the disc, proving to be a tough, durable disc with a 25-year warranty. By using a Val-Matic® Swing-Flex® Check Valve with rubber disc, the seat no longer leaked as a result of the abrasive application. The Swing-Flex® resilient seat is able to withstand the corrosive nature of the coke fines (or other abrasive materials) much better than metal-to-metal seats.

AK Steel had the innovative idea to use the standard port on the dome cover as a flush port (Figure 2) to remove the occasional coke fines that settle behind the disc. By using the cover as the flush port, they have eliminated the offline time and maintenance costs caused by taking the valve out of line and doing a complete backwash. The mill also uses the Backflow Actuator to sporadically backflush the pump.

The Results

AK Steel was replacing their swing check valve once every three months. Since installing the Val-Matic Swing-Flex® Check Valve with Backflow Actuator we have saved significantly on replacements and installation costs. The Swing-Flex® Check Valve has been installed for over a year and has performed flawlessly. AK Steel management has been so impressed by the performance of the Swing-Flex® Check Valve they have purchased additional valves for their sister mill in Ohio.

About the Author

“Author is the Plant Manager for AK Steel. He has an engineering degree from Marquette University and over 17 years of experience in Steel Industry, as well as an extensive background in biological water treatment systems including design, start-up, and troubleshooting.”