DeZURIK

APPLICATION SOLUTION
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HILTON HEAVY DUTY KNIFE GATE CHAR VALVE

APPLICATION:

In a process that converts paper mill waste products and sawdust into energy, a biofuel plant uses two knife gate valves in a lock hopper line to control the flow of high temperature char exiting the system. In this application, material builds up above the first valve, which seals against high pressure. The first valve opens to allow material into the piping between the two valves. After allowing a specified amount of material to pass, the first valve closes. The second valve then opens, releasing the material to the gravity fed pipe below. These valves operate every 20 seconds, 24 hours a day.

PROBLEM:

The bottom valve used in this lock hopper, a standard knife gate, performed acceptably. The top valve, however, had a service life anywhere from only a week to a couple of months due to the severe service conditions. The high temperature would cause the gate to bow and allow material to wire draw between the gate and seat preventing proper shut off. Also, due to the high heat when the gate bowed, it would create a fire that would come through the packing gland. The fire would frequently melt the wiring of the limit switches and solenoid valve which would also need to be replaced.

Replacing these valves meant shutting down the system, which in turn meant lost profit during the shutdown time. Despite the cost of shutdown, the biofuel plant was concerned about the relatively high price of a custom fabricated knife gate versus the standard valves they were using. Since this biofuel facility was a pilot plant, this problem was also an issue for future plants to be constructed.

SOLUTION:

After extensive study of the failed valves, Hilton was able to propose a valve to solve the problems associated with the severe conditions. A bonnetless valve with a gate wiper was used to better contain the pressure and thicker plate material was used for the gate along with a 316H stainless steel body and 310 stainless steel gate and seat to prevent deformation from the high temperature. The valve was also designed with flat face flanges to fit into the same face-to-face dimension as the existing cast valve. With these seemingly small improvements, the fabricated valves provided by Hilton were able to last extending the service life while reducing the risk of fire, resulting in a benefit to the customer in reduced shut down time and cost. The fabricated valve lasted 3½ years in this service compared to the maximum of two months from the standard knife gate valve. When the bio-fuel plant calculated the cost and service life compared to a standard knife gate valve, the fabricated valve paid for itself after only one year of service.

SALES AND SERVICE

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