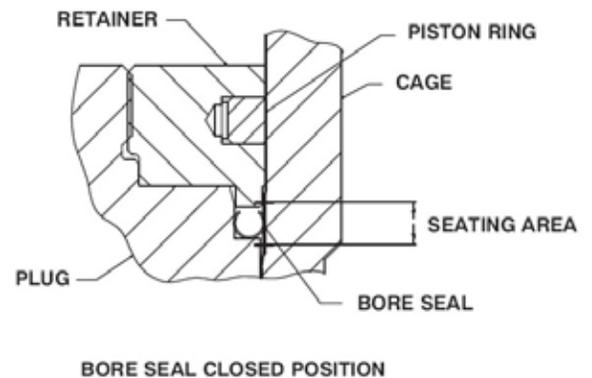


Leakage and Sticking Eliminated in Turbine Bypass Valves using Fisher® Bore Seal Trim

RESULTS

- The tighter shutoff achieved with the bore seal trim has reduced lost energy costs by an estimated \$435,000 per year.
- The wider tolerance of the bore seal design makes the valve less prone to sticking and start-up delays.



APPLICATION

Turbine bypass valves

CUSTOMER

Combined-cycle natural-gas-fired merchant power plant

CHALLENGE

During startup, shutdown, and load disturbances in a power plant, the boiler (heat recovery steam generator) and steam turbine need to be isolated from one another. This is to protect the turbine from any water carry over, protect additional plant equipment from large thermal transients, and reduce fuel consumption during startup and shutdown. In the event of a load rejection, reloading times can also be improved through the turbine bypass system.

Bypass valves play a major role in the turbine bypass system. The valves used in this 480 megawatt power plant had sticking and leakage problems for several years, requiring frequent maintenance and repair. Sticking valves would cause delays in turbine startup and steam leaking into the condenser was wasting energy and lowering condenser efficiency. It was thought that the leakage rate through these valves was exceeding Class II shutoff. Plant personnel contacted their Emerson sales office requesting a long-term solution to the problem.

New Fisher® bore seal trim is ideal for steam and gas applications requiring Class V shutoff.

SOLUTION

Emerson engineers recommended that their new bore seal technology trim be installed in the bypass valves and that larger actuators be installed on three of the valves to increase the thrust for higher seat loads to meet Class V shutoff. The bore seal design is intended for use in pressure-balanced, cage-guided, sliding stem valve trim to provide Class V shutoff per ANSI/FCI 70.2 for steam and gas applications.

The bore seal employs an enhanced version of the proven c-seal trim for use with large hung cages. A metal seal ring is secured to the outside diameter of the valve plug. The seal ring is positioned above the flow ports of the cage at all travel positions. Closure of the plug compresses the seal ring into a reduced bore in the cage, which is also above the flow ports. The compressed seal creates radial sealing forces that prevent flow between the plug and cage. Converting the turbine bypass valves to the new bore seal design achieves a Class V rating with the expectation that they would not degrade below a Class IV rating for at least three years.

RESULT

Using a typical market rate of \$100 per MW-hr and running 330 days per year, estimated energy savings from using the bore seal trim is \$425,000 per year.

An additional benefit is that with the wider tolerances of the bore seal trim the valves should be less prone to stick, thereby avoiding the start-up issues experienced with the previous valve trim.

For more information on severe service solutions, visit www.fishersevereservice.com.

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