



Control Valve Upgrade & Retrofit

Control valve upgrades & retrofit solutions for AEG Kanis and ABB Nuremberg steam turbines

GE offers valve improvements using its latest proven technology. These can be applied within a standard outage.

Reliability Improvement

Live steam control valves are key components for the operation of steam turbines; in addition to safe operation, they must operate reliably and precisely with minimum throttle losses.

A valve reliability upgrade solution involving the replacement of the valve internal parts only, has been developed for the Kanis and ABB Nuremberg series turbines. In addition, a leak-tight valve retrofit solution based on the Industrial Turbine Pre-stroke (ITP) valve solution can be provided improving reliability and allowing adjustment of the steam flow as is typically required with plant modifications.

Background

Older AEG Kanis control valve blocks (Fig. 1.) can combine up to three consecutive valve inlets arranged in a similar way to double seat valves. The spindles are guided by cages which are fabricated using pins welded to discs. The actuator drives only the first spindle, which at higher loads drives the coaxially-arranged and spring-loaded second spindle. For triple valves the third spindle is driven by the second as the load increases further.

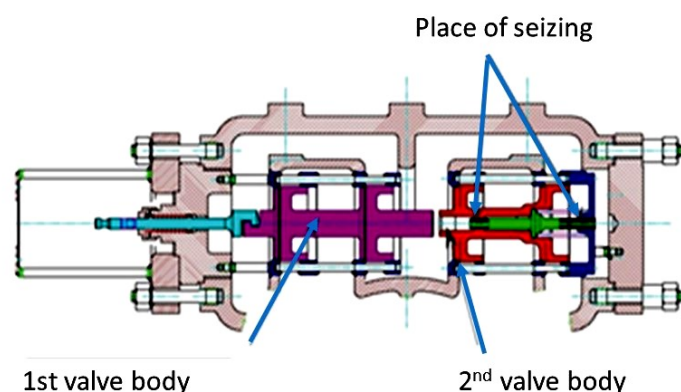


Fig. 1: AEG Kanis original steam control valve with two valve bodies

The original part suffers from the following:

- Uneven opening/closing and jumping of the second and third spindles
- Sticking of the spindles due to lack of concentricity when moving
- Seizing of spindles caused by deposits from the live steam
- Ineffective or incorrect valve closing due to springs suffering from creep deformation.

The above-mentioned issues can lead to steam leakage and unintended running of the turbine, which will affect the reliability.

Solution

On the base of a wide experience, GE offers upgrade and retrofit solutions for AEG Kanis and ABB Nuremberg HP and LP control valves.

The upgrade solution (Fig. 2.) aims to improve reliability by replacing some of the internal components: firstly, the welded cages are replaced with cages machined from a single piece. This allows for better tolerances at the bearing and spindle seat surfaces, and reduces distortion. The bearing surfaces of the cages guiding the spindles are enlarged, and the rear and middle cages can be made from one piece. These layout improvements reduce the risk of the spindle seizing due to misalignment.

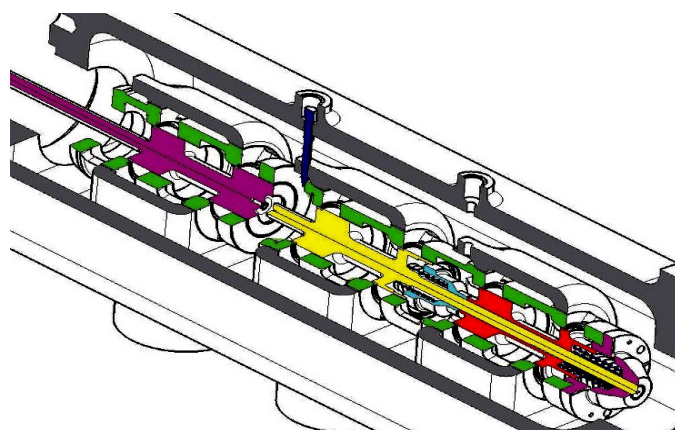


Fig. 2: AEG Kanis upgraded steam control valve with three valve bodies

Secondly, the old spindles are replaced by spindles with a larger bearing surface in the guide zones. Thirdly, state of the art surface hardening and coating is applied to critical surfaces on both the cages and the spindles made from austenitic steel. Finally, machining of the outer cage diameter is carried out to ensure the needed fit with the valve casing.

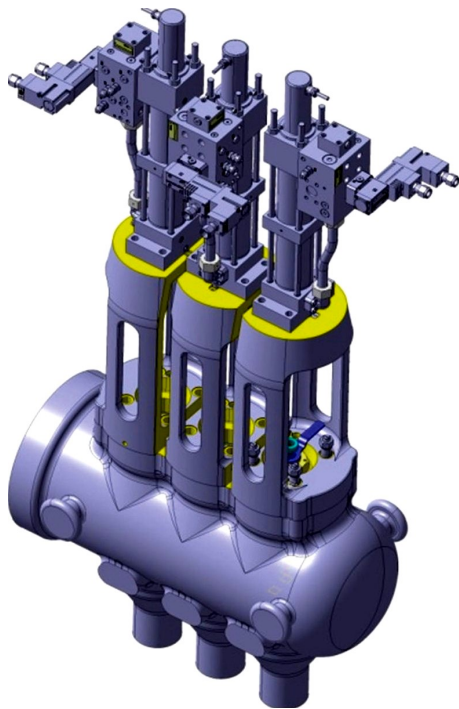


Fig. 3: AEG Kanis retrofitted steam control valve with three valve bodies

With the retrofit solution (Fig. 3.) the current valve configuration is replaced in its entirety with a unit to GE's latest industrial turbine pre-stroke (ITP) concept. This solution allows for any changes to steam flow that may result from later plant modifications. The existing valve block is replaced with a block of individually actuated control valves. The replacement scope includes the chest, valve internals, actuators, 120 bar hydraulic pack and trip block. Adjustment to most steam conditions are allowed by replacing the entire block.

As implementation time is essential for operators, pre-engineering and procurement of components are provided on the base of information from the operator. Material stockholding, re-engineering and an established internal and external manufacturing network contribute to short lead time.

To customize the configuration to the requirements, GE relies on years of retrofit experience. An upgrade solution of the valve internals can be done within the time frame of a major overhaul of the steam turbine. The retrofit solution requires longer lead times for the castings as well as for the application engineering.

Benefits

- Reduced maintenance cost

This is the result of a better valve reliability.

- Increased valve flexibility

Due to a flexible flow control and reduced throttle losses.

- Increased valve reliability and availability

Compared to the simple repair or replacement of internal components, GE's upgrade solution provides long lasting improvements in operability and reliability.

With GE's retrofit solution, the operator not only gains in operability and reliability but also in control precision and the elimination of losses. These factors lead to better overall plant efficiency and flexibility.

Applicability

The upgrade solution is applicable to AEG Kanis SST 200/300/400 and ABB Nuremberg industrial steam turbines of types G16-G80 (backpressure) and V20-V100 (condensing).