Control Valve Actuator Upgrade

Control valve actuator upgrade solutions for Wesel steam turbines

GE offers valve actuator improvements exploiting its latest technology. These can be installed during 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 reliable and precise, reducing the risk of leakage losses, wearing and unplanned outages.

GE has developed several improvements for Siemens Wesel steam turbine valves. By means of internal parts modifications and technology improvements, the most typical issues affecting the valve actuators are significantly mitigated, reducing both maintenance costs and risks of unplanned shut down.

Background

The Siemens Wesel control valve block may typically suffer form the following issue :

- Oil leakage at upper guide and seal bushing of HP valves actuators (Fig. 1)

The servo cylinder actuates the control valves via the lever and valve stems. If leverage points are not properly aligned, the sealing elements experience an abnormal load and may often lead to oil leakage and wear.

Solutions

With a wealth of many years of experience, GE is able to provide upgrade solutions for the valve actuator, which are carried out within the time frame of a major overhaul of the steam turbine and help mitigate the oil leakage.

Upgrade Solutions to Mitigate Oil Leakage

1. Upgraded servo cylinder - sealing kit
2. Upgraded servo-cylinder with full scope
3. Electrical actuator

Upgrade solution 1 features a more stable guiding and an extended lifetime of the hydraulic cylinder by providing a new actuator bushing with modern sealing kit and a renewed sealing kit for piston (Fig. 2). The actuator upper cover is reworked to enlarge the bore hole, but reworking might be necessary also for the existing piston rod, when significantly worn.

In the **upgrade solution 2**, a double-guided servo cylinder has been developed (Fig. 3), including the efficient sealing system described in the previous solution. Oil leakage at the piston rod is mitigated by improving guidance and reducing wear or localized loads at the guide bushings. Modernized pin joint and support geometries further result in load and wear mitigation, reduced tilting of the actuator and easier accessibility. The original connection point geometry to the mechanical pilot valve and same key dimensions are retained.

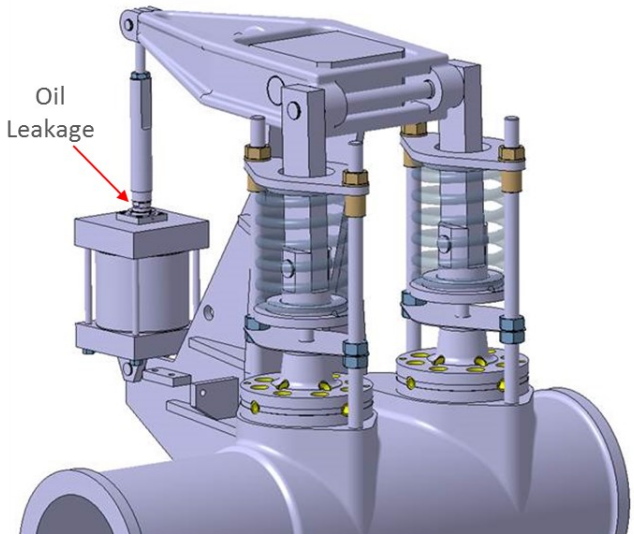

Fig. 1: Control valve block assembly (Type 1)

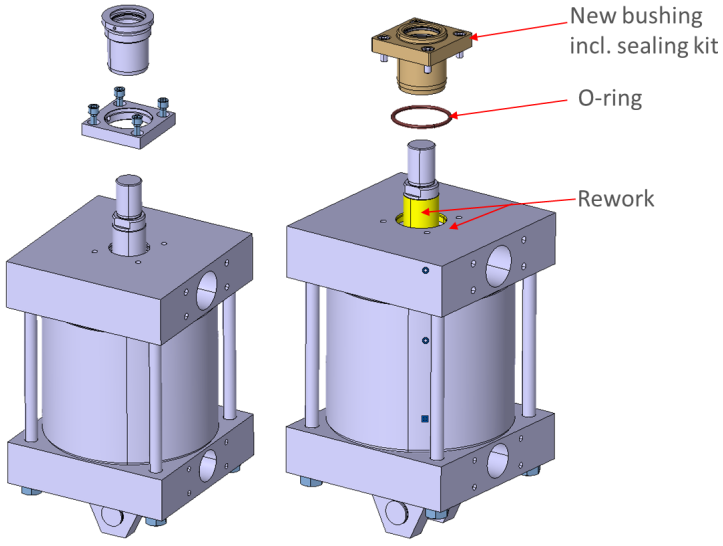

Fig. 2: Original (left) and upgraded (right) servo-cylinder

Upgrade solution 3 consists of a full actuator replacement with a modern electrical actuator (Fig. 4). This upgrade solution is suitable for those customers interested in a fast and effective solution, since the replacement can be carried out in a very short time window.

Component	Solution 1	Solution 2
1) New top bushing	x	x
2) New bottom bushing	x	x
3) New actuator piston rod	x	x
4) New actuator bottom cover		x
5) New articulation shafts		x
6) New bronze bushings		x
7) Actuator rod cover		x
8) New grip		x
9) Shear pin		x
10) Reworked actuator piston	x	x
11) Reworked top cover	x	x

Table 1: Upgrade solution 1 and 2 scope

Benefits

- Reliability and availability

Compared to the simple repair or replacement of internal components, GE's upgrade solutions provide long lasting improvements in reliability and operability. These factors may lead to better overall plant efficiency and flexibility.

- Cost effective upgrade solution

The operator can address the typical issues of control valve actuators reducing leakage losses and gaining in control precision and mitigation.

- Reduced maintenance cost

This is also related to the mitigated risk of unplanned shut down which may result in significant cost saving.

- Lifetime extension

Applicability

These upgrade solutions are specifically developed for SST 600 Wesel units based on Wesel building block configuration.

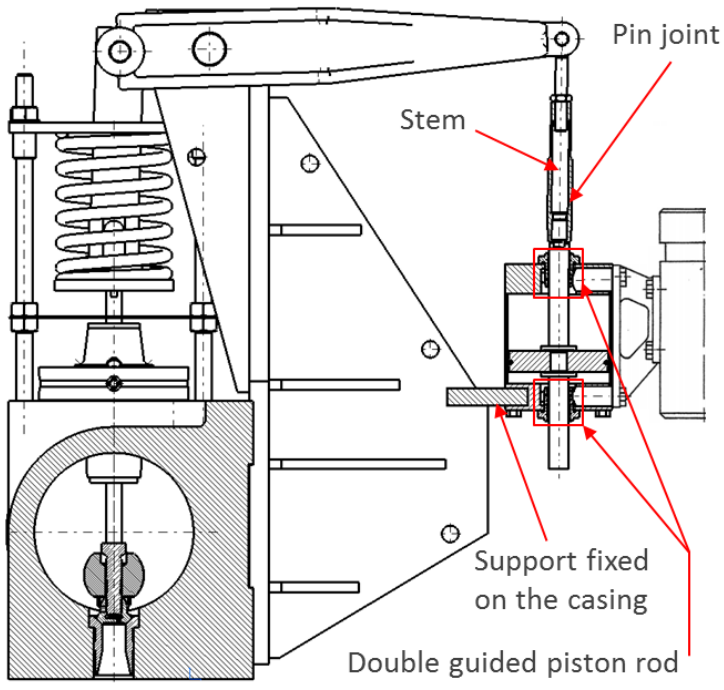

Fig. 3: Upgraded double-guided hydraulic cylinder (solution 2)

Fig. 4: Electro-hydrostatic actuator

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