THE PROBLEM OF PIPELINE VALVES REPLACEMENT

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The chosen theme is crucial but specific. From practical experience is known that the operation concerning the replacement of the whole pipeline valves at an electrical station is not economically profitable, since payback of such project is long and can last for decades. However, nobody studied and considered this issue from a technical point of view. Therefore, it is necessary to investigate this procedure.

The object of our research is Gusinoozerskaya thermal power plant put into operation in 1976. At that time, the pipe valves installed were modern and new. The resource of the whole pipeline valves is about 100 thousand hours, which is about 15 years. In 1981, it had to undergo the replacement. However, currently, most of the valves have worked off their service life. The old equipment is still in service, firstly because it is too expensive and unprofitable to replace, secondly by proper maintenance the old equipment can operate for a long time without replacement.

The purpose of this research is to consider the efficiency of the replacement of the obsolete old pipeline valves by the new ones.

First of all it is important to analyze and define what pipe and tube valves are.

Pipe and tube valves are facilities installed on pipelines, units, vessels and intended to control (switching off, distribution, control, reset, mixing, phase separation) the working fluid flow (liquid, gas, gas-liquid, powder, suspension, and etc.) by changing passage area.

The main parameters of the valve are as follows: its performance, pressure, temperature, bandwidth, corrosion resistance, drive type, required torque for valve control, time response.

The main construction-mounting options include:

- nominal diameter passage
- construction length and height
- Weight
- Type of connection to the pipeline
- the design and dimensions of connecting flanges
- The number, size and location of the holes in the flanges
- cutting welded to the pipeline

Materials.

The main materials used for valves construction are: grey cast iron, ductile iron, acid-iron, heat-resistant cast iron, alkali-resistant cast iron, anti-friction iron, steel, carbon steel and alloy steel.

The technology of pipeline valves maintenance

Pipe and fittings, depending on the degree of wear of their parts and assemblies and repair category are repaired in a workshop or on-the installation site. Typically, larger valves are not removed from the pipe and their assembly and disassembly is carried out on the site.

The valves with a nominal diameter of DN 10-20 mm by the overhaul of the main power equipment are basically repaired in the workshop (workshop or on the site of its installation). By the current trend to increase the duration of the service period the repair of valves must be based on the rating method. The increase of the life service of the basic equipment is only when the valves are dismantled and deliver to the shop for disassembly and repair.

Visual inspection checks all the components of the valve, with the exception of the components are not allowed to reuse (gaskets, packing, etc.). Visual inspection pay special attention to the places most susceptible to corrosion, erosion and mechanical wear (sealing surface of the gate, the regulatory body, the cylindrical surface of the gate, the regulatory body, the cylindrical surface of the spindles, rods, packing follower, packing rings, etc.).

Trouble-free time of all newly installed elements of pipeline valves in the system is much higher than the ones that are running under load for a long time. Thus, we can conclude that trouble–free operation of the equipment leads to improved reliability of the entire power station.

It is well-known that the scheduled replacement and repair of pipe valves is slower than the rate of their wear. To ensure reliable operation of networks and facilities is impossible without their modernization and replacement of valves and pipes. The longer the pipe fittings-service life is, the more often an emergency replacement procedure occurs.

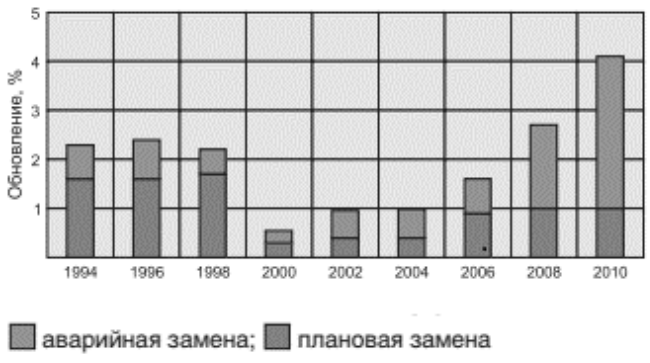

Fig. 1. The dynamics and structure of renewal of fittings

Figure 1 shows an example of the dynamics of renewal of valves at the municipal enterprise of Samara "Samarovodokanal." The situation at other hydropower plants and thermal power plants is similar.

The move from permanent emergency repairs to a planned upgrade is possible by the introduction of modern high-quality equipment with long life service and trouble-free operation.

The experience of the valves use shows that investment in the replacement of valves does not only ensure stable operation of the system, but also can be recouped within the long run.

Modern valves for pressure systems are made of ductile cast iron with nodular graphite (ductile iron). According to its working characteristics this material is close to steel. Like any high-tech material, ductile iron castings requires special technology, equipment, qualified personnel and special controls.

Ultimately, the best guarantee of the quality of the equipment is its uptime, so when choosing a manufacturer you must make sure you have the appropriate positive experience in Russia or countries with similar climatic conditions.

To find out the causes of effective and ineffective operation of equipment the SWOT-analysis was made.

The SWOT-analysis is intended to determine the strengths, weaknesses and potential external threats and opportunities and allows also to assess the strategically important competitors.

SWOT-analysis

Opportunities	Strengths
The presence of external investors	Friendly and co-ordinared staff
There is no competition at the market - the equipment is free access	Availability of the equipment
Threats	Weaknesses
Not all investors are willing to sponsor the project	It is necessary to hire some special maintenance teams
Very big payback period	The work must be carried out as soon as possible
Long of purchased equipment	Weak reputation of the project

The total cost of replacing makes up 9.283 million rubles.

The total cost to repair all pipe valves = 4.226 million. rubles.

Such a large difference in cost is due to the fact that the repair-parts two-thirds are less than the new equipment.

Conclusion

We came to the conclusion that the replacement of all obsolete valves results in the reliability increase of the whole power station. However, the replacement of all obsolete valves is economically unfeasible and it is difficult to find companies ready to invest to the project.

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GEOTHERMAL POWER ENGINEERING

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Abstract

Our world is changing and it becomes more and more real to replace traditional sources of energy by new ones. Alternative sources of energy have a lot of pluses and minuses. Alternative energy seems to be really ef-