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CAUSES OF DECREASE IN PUMP PERFORMANCE

Abstract: *This scientific article focuses on the negative aspects that can occur during the efficient use of water intake facilities, their causes and the issues of their elimination. Recommendations that can be followed during the start-up and operation of pumps, as well as the timely elimination of adverse events, will extend the service life of pumps and increase productivity.*

Key words: *Water level, pump, pressure, hydraulic abrasion, water intake unit, cavitation, hydraulic resistance, power factor, pump stations, automation equipment.*

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Introduction

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The decline in the performance indicators of pumping devices that receive water from natural sources in conditions of functional recovery depends on the object and sub-factors. The geological characteristic of the water source, that is, the water level, the amount of turbidity in the water, the size of the solid particles in it and the change in mineralogical composition are the correct connections of the indicators of the use of pumps to the decrease, and are an example of factors. For example, with a decrease in the water level in the source, an increase in static pressure and suction height, an increase in suction resistance in the suction network caused by mud deposition in the avankamera and water-shielding units leads to a decrease in the water transfer of the pumps and an increase in the likelihood of cavitation formation. In addition, under the influence of solid particles in the water, the water transfer, pressure and Fig of the pumps are reduced.

One of the main reasons for the decline in the performance indicators of the pumps is the cavitation and gidroabraziv ingestion of their work details. Gidroabraziv ingestion occurs under the influence of solid particles in muddy water. In Central Asian conditions, both types, namely cavitation-abrasive ingesting, occur together. Cavitation ingestion can occur under the influence of two different factors: it occurs due to the deteriorating conditions of Use and the poor quality of preparation of the pump. As a result of the deterioration of the conditions of use, the actual amount of vacuum in the suction of the pump is increased. The main reasons for this are the turbidity in the water intake unit and the increase in the value of the suction height limit due to the decrease in the water level caused by the pollution of the grate, the second factor, that is, because the pump is made of poor quality, the cavitation pointers in its passport may not be able to.

In the case of cavitation ingesting parts of the

pumps, which the amount of vacuum is greatly increased, dangerous zones are considered. In centrifugal pumps, the inlet part of the working wheel shovels is the rear side A, the surface of the lappet and the edge of the throttle of the tyrqishi can be such dangerous deflection zones. In the ukiy pumps, cavitation absorption is formed in zones A at the rear of the inlet part of the working wheel shovels, V at the end of the wing section, S at the surface of the working section, D at the side of the shovel and E at the surface of the sponge.

In order to reduce the intensity of cavitation in the slot, it is recommended to grind the side end of the blades in a round form or to place the wings on the tip of the Blades. In cases where in the composition of the transferred water there are caustic granules sand, as a result of their gidroabrazive effect, there is an acceleration of absorption in the elements of the pump. Observations show that in the centrifugal pumps, the front side of the working wheel blades is exposed to high-intensity gidroabrazive ingesting of the elements of the condensing part of the inlet a and exit b parts in the water under the influence of the solid particles.

Control-measuring instruments are installed to ensure the uniform operation of the facilities and basic equipment of the pumping stations. The composition, type and installation location of the instruments are determined depending on the working process of the main equipment and their management system (automatic dispatching, local).

The pumps are controlled by the following main technological indicators: the water transmission of the pumps, the pressure in the pipes, the water flow in the water intake unit and its difference in the grid, the voltage, power, power coefficient and frequency of the drain supplied to the electric motors, the amount of electrical energy consumed, the aulanish frequency of the Val, the sales, etc. In order to measure water consumption in the pumps, volumetric flywheel meters are used, narrowed cross-section surface, parsial, ultrasonic and electromagnetic flow meters.

Automation tools provide control of nasos aggregates without the participation of staff, on the basis of a pre-developed program, stantsiy reliable and continuous operation of the unit, increases the level of equipment retention and the work efficiency of the aggregates, ensures that the working conditions of the employees are improved and productivity is high.

According to the control feature, the pumps are divided into the following types:

- manual operated-all work on the operation and suspension of aggregates is carried out by employee;
- automatic control -all work on the control of the pump is carried out by automatic means located inside the building;
- automatic remote control-all work related to the operation of aggregates, stopping and rooting of water transmission is resisted from the distpecherlik punk, which is located at a distance from the building of the pumping station.

The structures and equipment of the pump should be provided with control-measuring devices that record violations of the operating procedure in a norm and stop the damaged aggregates or stantsiya in dangerous, overload situations arising from the loss of signal concentration.

Automatics tools perform the following tasks:

- makes and transmits impulse dressing to start and stop electric motors of main pump aggregates;
- maintains a certain amount of time between the processes associated with the start and stop of electric motors;
- provides the operation of serial pump units in accordance with the established procedure;
- maintains the amount of vacuum in the suction pipe;
- opens and drips the zadvishka in the pipe;
- the worker whose work order is broken will stop the aggregate and start the reserve aggregate;
- alarm the assembly to distpecherlik punk by case;
- operates and stops drainage pumps;
- keeps the heating and ventilation system indicators set at the pump station;
- adjusts the water transfer and pressure of the pump units.

In automated pumping units, the process of starting and stopping the pumping units should be carried out on the basis of the sent impulse strictly according to the sequence of keglik. For example, when aggregates are installed from the water satchel to the cargo, vakuumnasos is launched to fill them with water. With water filling to the main pumps, the electrocardiogram sensor (ERSV-Z) signals the movement of the main electric motors and the cessation of vacuuming. With the arrival of electric motors at the rated frequency of rotation, a signal is given to the opening of the locks and the completion of the walking process with their full opening. Stopping the pumping unit is carried out in the reverse order.

During the period of operation of the automated pumping stations, the following are controlled: water supply in water facilities and drainage wells, oil sales in oil baths and oil-oil boilers of electric engines, as well as the flow of water in electric motor ores and bearings, water, oil and air pressures in pipelines, water flow in technical water supply systems, the difference of water means of automation of the dizziness processes are applied electromagnetic, mechanical, gravity and heat appliances to provide an unchanging current, which will dressing unchanging current generator. The work of the automatic system of the pump station is carried out using sensors, relays and magnetic contactors.

The high-intensity gidroabraziv deflection parts of the axial pumps account for the zones on the front

side of the adjustment blades, which correct the input and output concentration on the front side of the working wheel blades.

The mechanism of cavitation and gidroabraziv ingestion of details is quite complex, and many issues have not been solved. The occurrence of gidroabrazive absorption on the flowing surfaces caused by shock and irritation of solid quartz particles in the water is recognized by many researchers.

On the basis of the dynamics of the point of the material sinking on the surface of the metal resisting, formulas for the determination of the amount of gidroabrazive ingesting of certain elements of the pump are drawn out.

As cavitation, it is said that at some point in the fluid flow, the continuous property of the flow is disturbed, due to a decrease in the pressure to the amount of tension (critical), that is, its saturated vapor (elastic) pressure. This process is caused by dividing the dressing of cavitation bubbles filled with gases and vapors in the liquid.

In spherical pumps, cavitation bubbles are formed near the surfaces of the working wheels, where the fluid flow pressure decreases to a critical amount, and they act on the floor-pressurized parts with the flow. At the influence of pressure on the above, the vapor in the bubble turns into a liquid, that is, it condenses. As a result of the large-speed aspiration of liquid particles from the sides into the cavity of the dressing bubble, there is a collision of them and an increase in pressure in the amount of several thousand atmospheres, that is, the bubble burst. As a result of this, a micro-flux is formed, which has a large speed and causes a shock to the metal surfaces. The speed of the micro-flux is so high that in this place the liquid is "cumulative", that is, the state in which it acquires the property of a solid body, and absorbs the metal surfaces.

The development of cavitation leads to a decrease in the indicators of the pump, in which there is a decrease in noise, course sounds and flickering.

The reasons for the decrease in pressure, which leads to the formation of cavitation in tubular pumps, are as follows:

a) relative speed increase as a result of increased fluid transfer;

b) formation of irregularities and surface separations in the fluid flow due to the fact that the internal structure of the pump is not perfect;

c) increase in the geodetic suction height of the pump and the resistance of the suction network to gravity;

d) decrease in barometric pressure, increase in fluid flow in the concentration.

Timely elimination of these situations leads to an increase in the shelf life of the pumps uzaytirib, work productivity.

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