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ANALYSIS OF THE NEGATIVE IMPACT OF CAVITATION, DIRT AND SPILLS ON PUMPING DEVICES

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ABSTRACT: - In this article, at present, at many pumping stations, water is supplied for public consumption, for industrial production buildings, for growing agriculture, that is, in the pumping units of pumping stations, various troubles that arise due to external factors, including energy loss in engines that drive pumps, products in pumps, cavitation and hydroabrasive corrosion, and ways to eliminate them are considered.

KEYWORDS: Cavitation, pumping units, pump impellers, hydroabrasive wear, hydrodynamic resistance, turbidity level.

INTRODUCTION

Currently, in the water supply system for growing agricultural products from many pumping stations, various problems are being developed that arise in pumping units due to external factors, including cavitation and hydroabrasive corrosion of pump working sheets, and ways to eliminate them. their elimination is one of the pressing problems of the modern era.

Long-term operation of pumps in difficult conditions, mainly in water supply networks, during the operating hours of pumping stations will lead to the following negative consequences for its operation:

- bringing the pumping device and its parts (cavities of the working chamber, bearings) into a state that cannot be completely

repaired, taking into account the fact that it has not been used for a long time;

- failure of backbone networks due to physical deterioration;
- analysis of the operating conditions of a centrifugal pump unit shows that hydroabrasive wear dramatically affects the change in its parameters and causes an increase in hydrodynamic resistance, thereby reducing its performance.

An analysis of the results of scientific studies conducted to date shows that cases of sudden failure of devices as a result of fluid entering pumping stations have reached 25-35% [3.4].

Figure 1. Pump casing status locked

1-water intake path of the pump; 2-cone, caught in the water path.

Situations leading to damage to pumping units during operation include mainly mechanical damage (breakage of part of the wheel, failure, in some cases, bending, breakage of shafts) as a result of the action of liquids on moving impellers. at high rotation speed. In this case, in turn, there is a failure of the hydromechanical equipment in the pumping station of the irrigation system.

When large water leaks come from one side of double suction pumps and the water inlet is blocked on one side, this causes vibrations in the pump units and a decrease in the efficiency of pumping water (at this time, the transverse and longitudinal forces on each pump element change the direction of impact, and the total the device causes vibration. Imbalance adversely affects the operation of the pumps.

Also, during observations conducted at the Norin-Syrdarya pumping station, there were cases when reeds got into the pump and partially blocked the water path. This reduced the efficiency of pumping water by pumping devices and consumed excess electricity. A situation occurs that leads to energy consumption.

The degree of turbidity of the Syr Darya is high, and its composition is always determined as a result of scientific research and observations conducted by Uzhydromet. Because there are many reservoirs, gauging stations and pumping stations in the Syr Darya basin. To study the impact on such hydraulic structures, it is necessary first of all to observe their composition and changes. In years of heavy rainfall, erosion of river banks, erosion of fine sand and stones in the mountains also leads to an increase in turbidity in the river. In the Syr Darya, it is less compared to the content of

turbidity in the Amu Darya. The percentage distribution of turbidity in the Syr Darya by diameters has been established in scientific studies carried out so far [1].

Cavitation is one of the main causes of defects in impellers and pump casings [2]. Cavitation is understood as a violation of the continuity of the flow as a result of a decrease in the pressure of the fluid flow to the tension (critical) value, that is, to the level of pressure of its saturated vapors (elasticity). This process causes the formation of cavitation bubbles filled with gases and vapors in the liquid.

As is known, in pumping stations, the advanced stage of cavitation is mainly characterized by the presence of built-in cavitation zones of a certain size, which change the effective guide surface and narrow the free area. There is a local increase in the flow velocity, there is a secondary movement of the fluid. Due to the increase in hydraulic losses, the characteristics of the machines are deteriorating.

In centrifugal pumps, cavitation bubbles form near the surfaces of the impeller and the internal surfaces of the pump housing, where the pressure of the fluid flow drops to a critical value, and they move with the flow to high-pressure parts. Under the action of high pressure, the vapor inside the bubble turns into a liquid, that is, condenses. As a result of the high-speed suction of liquid particles from all sides into the space in the formed bubble, they collide and increase the pressure by several thousand atmospheres, that is, the bubble bursts. As a result of this, a microflow occurs, which has a high speed and hits the inner surfaces of the impeller and its casing. The pressure of the microflow is so great that at this point the liquid becomes "cumulative", i.e. has the properties of a solid body and absorbs the surfaces of the impeller [3]

Due to the fact that the corrosion of pump parts under the combined action of a cavitation-abrasive flow depends on very complex processes, it is currently not possible to derive formulas for its theoretical determination.

Rice. 2. Damage to the pump impeller due to cavitation erosion and hydroabrasive spreading

1-pump ishchi parragi; 2-cavitation eyelash

To prevent cavitation absorption, it is necessary to ensure a geodesic suction head when using pumps. In cases where the water is clean and flows without obstruction, a positive result can be achieved by providing a suction height.

REFERENCES

1. Negmatov M. K., Zhuraev K. A., Yuldashev M. A. Treatment of Sewage Water of Electrical Production on Recycled Filters //International Journal of Advanced Research in Science, Engineering and Technology. – 2019. – Т. 6. – №. 10. – С. 11132-11135.
2. Negmatov M. et al. Induction of cytoplasmic male sterility in cotton by the method of radiation mutagenesis //Soviet genetics. – 1975.
3. Negmatov M. K., Kurbanova O. B., Tukhtabaev A. A. Water purification of artificial swimming pools //Novateur Publication India's International Journal of Innovations in Engineering Research and Technology [IJIERT] ISSN: 2394-3696, Website: www. ijiert. org, 15th June, 2020]. Pp 98. – Т. 103.
4. Негматов М. К., Атамов А. А., Буриев Э. С. Автоматика систем водоснабжения и контрольноизмерительные приборы //Учебное пособие/-Ташкент: изд.“Тафаккур Бустони”, 2017.-368 с.(на узбекском языке). – 2017.
5. Negmatov M. K. et al. WATER EXCHANGE MODE IN SWIMMING POOLS WITH RETURN WATER SUPPLY SYSTEM //EPRA International Journal of Multidisciplinary Research (IJMR). – 2021. – Т. 7. – №. 4. – С. 1-1.
6. НЕГМАТОВ М. К. и др. Фильтр для очистки жидкости. – 1990.
7. ТОЛКАЧЕВА С. Е. и др. Патронный фильтр для очистки жидкости. – 1993.
8. РУДЗСКИЙ Г. Г. и др. Патронный фильтр для очистки жидкости. – 1990.
9. Negmatov, M. K., A. A. Atamov, and E. S. Buriev. "Automation of water supply systems and instrumentation." Study guide/-Tashkent: ed.“Tafakkur Bustoni (2017).
10. Negmatov M., Boboeva G., Negmatov U. Environmental aspects of processing and use wastewater sludge in agriculture //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2022. – Т. 1076. – №. 1. – С. 012046.
11. Negmatov M. et al. Induction of CMS in cottonplants by means of radiation-induced mutagenesis //Genetika. – 1975. – Т. 11. – №. 12. – С. 136-138.
12. Akramov, A. A. U., & Nomonov, M. B. U. (2022). Improving the Efficiency Account Hydraulic of Water Supply Sprinklers. Central Asian Journal of Theoretical and Applied Science, 3(6), 364-370
13. Juraev, S., Akramov, A., Abdurazzokov, A., & Pathidinova, U. (2022, August). Increasing the efficiency of sedimentation tanks for drinking water treatment. In IOP Conference Series: Earth and Environmental Science (Vol. 1076, No. 1, p. 012049). IOP Publishing.
14. Arifjanov A. et al. Increasing heat efficiency by changing the section area of the heat transfer pipelines //IOP Conference Series: Materials Science and Engineering. – IOP Publishing, 2020. – Т. 869. – №. 4. – С. 042019.
15. Arifjanov A. et al. Determination of filtration strength and initial filtration gradient in soil constructions //Journal of Advanced Research in Dynamical and Control Systems. – 2020. – Т. 12. – №. S4. – С. 1860-1864.
16. Arifjanov A. et al. Increasing heat efficiency by changing the section area

of the heat transfer pipelines //IOP Conference Series: Materials Science and Engineering. – IOP Publishing, 2020. – Т. 869. – №. 4. – С. 042019.

17. Arifjanov A. et al. Determination of filtration strength and initial filtration gradient in soil constructions.(2020) Journal of Advanced Research in Dynamical and Control Systems, 12 (4 Special Issue) //DOI. – Т. 10. – С. 1860-1864.
18. Sh J. Determination of water permeability of local ground in field conditions //Indo-Asian Journal of Multidisciplinary Research. – 2019. – Т. 5. – №. 1. – С. 1592-1596.
19. Niyozmatova N. A. et al. Method for selecting informative and non-informative features //IOP Conference Series: Materials Science and Engineering. – IOP Publishing, 2020. – Т. 919. – №. 4. – С. 042013.
20. Arifjanov A. et al. Farruh Babajanov Determination of Filtration Strength and Initial Filtration Gradient in Soil Constructions //Jour of Adv Research in Dynamical & Control Systems. – 2020. – Т. 12.
21. Jurayev S. S. ANALYSE OF THE PERMEABILITY OF BENTONITE AND SAND IN SOIL STRUCTURES //Theoretical & Applied Science. – 2019. – №. 3. – С. 437-440.
22. Arifjanov, A., & Sh, J. (2019). Research of water permeability of soils used under doming. European science review., Vienna, Austria, 1(2), 94-95.
23. Арифжанов А. Методы изучения фильтрационных особенности бентонитов в гидротехнических сооружениях //The collection includes scientific-materials of the International conference participants on the theme of" Topical issues of import substituting products based on the use of local raw materials in the Fergana valley" held on. – 2018. – С. 271-273.
24. Arifjanov A., Jurayev S. European science review. – 2018.
25. Arifjanov A., Jurayev S. The value of bentonite in the study of the filtration process in hydraulic structures //Fer PI scientific and technical journal. – 2012. – №. 3. – С. 14-17.
26. Арифжанов А., Жураев Ш. Значение бентонита в изучении процесса фильтрации в гидротехнических сооружениях //ФерПИ научно технический журнал. – 2012. – №. 3. – С. 14-17.
27. Jurayev, & Sh, S. (2019). Analyze of the permeability of bentonite and sand in soil structures. ISJ Theoretical & Applied Science, Philadelphia, USA., 3(71), 437-440.
28. Жураев Ш. Фильтрация жараёнини ўрганишда бентонитнинг аҳамияти //Республика ёш олимлар Илмий-амалий конференцияси" Маъруза тезислари тўплами. – 2014.
29. Арифжанов А., Ибрагимов Ф., Жураев Ш. Магистрал каналларда нисбий филтьрация сарфи //Қишлоқ ва сув хўжалиги вазирлиги" Агро илм" илмий журнали. – 2013. – №. 2. – С. 26.
30. Xodjiev N. et al. Increasing efficient use of water storage pools //AIP Conference Proceedings. – AIP Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 040037.
31. Arifjanov A. et al..(2020) Journal of Advanced Research in Dynamical and Control Systems, 12 (4 Special Issue) //DOI. – Т. 10. – С. 1860-1864.
32. Arifjanov A. et al. Analysis of the resource-saving method for calculating the heat balance of the installation of hot-water heating boilers //AIP Conference Proceedings. – AIP

Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 020019.
33. Arifjanov A., Sh J. Study of water permeability of bentonite //SCIENCE AND WORLD International scientific journal. – 2019. – Т. 4. – №. 68. – С. 33-35.
34. Muxamedjanovich A. A., Sharipovich J. S. Analyse of water permeability of soils used for Damb construction //European science review. – 2019. – Т. 1. – №. 1-2. – С. 94-95.
35. JURAEV S. Informatizace veřejné správy v ČR : дис. – AMBIS vysoká škola, as, 2017.
36. Juraev S. et al. Increasing the efficiency of sedimentation tanks for drinking water treatment //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2022. – Т. 1076. – №. 1. – С. 012049.
37. Arifjanov A. et al. Definitions of the bentonite filtration coefficient in the logon deposit in the fergana valley // AIP Conference Proceedings 2432, 040003 (2022); https://doi.org/10.1063/5.0091173
38. Melikuziyev S. et al. New technology for protecting agricultural products from pests //AIP Conference Proceedings. – AIP Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 040015.
39. Juraev S. et al. DROPS OF DRIP IRRIGATION SYSTEM TECHNICAL CHARACTERISTICS // Web of Scientist: International Scientific Research Journal, 2022. – Т. https://doi.org/10.17605/OSF.IO/FPT47.
40. Juraev S. et al. DRIP IRRIGATION //International scientific and practical conference cutting edge-science, september, 2020 shawnee, usa conference proceedings
41. Жураев Ш. Ш., Патхидинова У. С. КАПЕЛЬНОЕ ОРОШЕНИЕ: ПОНЯТИЕ И ОСОБЕННОСТИ //Вестник Науки и Творчества. – 2020. – №. 1 (49). – С. 16-20.
42. Жураев Ш. Ш. ИССЛЕДОВАНИЕ СВОЙСТВА БЕНТОНИТА МЕСТОРОЖДЕНИЯ ЛОГОН В ФЕРГАНСКОЙ ДОЛИНЕ //ББК 1 А28. – 2019. – С. 36.
43. Арифжанов А. М., Жураев Ш. Ш. ИССЛЕДОВАНИЕ ВОДОПРОНИЦАЕМОСТИ БЕНТОНИТА //Наука и мир. – 2019. – Т. 1. – №. 4. – С. 33-35.
44. Sherali J. IMPROVEMENT OF PROFESSIONAL TRAINING OF FUTURE ECONOMISTS ON THE BASIS OF INTERACTIVE TEACHING METHODS //Zbiór artykułów naukowych recenzowanych. – С. 77.
45. Sherali J. et al. Investigation of the bentonite properties of the Logon deposit in the Ferghana Valley //Scientific and Publishing Center “Actuality. RF.”, XIX International Scientific and Practical Conference “Advances in Science and Technology”
46. Juraev S. Investigation of the bentonite properties of the Logon deposit in the Ferghana Valley // Scientific and Publishing Center “Actuality. RF.”, XIX International Scientific and Practical Conference “Advances in Science and Technology”, 2019. – Т. №. 1. – С. 36.
47. Касимов Т. О., Ахмадалиев С. МОДЕЛИРОВАНИЕ ЗАДАЧИ О ВЫНУЖДЕННЫХ КОЛЕБАНИЯХ ПЛОТИНЫ-ПЛАСТИНКИ С ПОСТОЯННОЙ И ПЕРЕМЕННОЙ ТОЛЩИНЫ ПРИ ДЕЙСТВИИ СЕЙСМИЧЕСКОЙ НАГРУЗКИ.
48. Имамназаров О. Б. ОПТИМИЗАЦИЯ НОРМЫ ОСУШЕНИЯ НА ФОНЕ

ВЕРТИКАЛЬНОГО ДРЕНАЖА //Science Time. – 2019. – №. 6 (66). – С. 99-104.

49. Xoshimov S. et al. Analysis of fractional and chemical composition of chartak reservoir sludge sediments //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2022. – Т. 1076. – №. 1. – С. 012083.

50. Мамажанов М., Иброхимжонов Х. Ш. НОВЫЙ УПРОЩЕННЫЙ МЕТОД ОПРЕДЕЛЕНИЯ ВОДОПОДАЧИ ЦЕНТРОБЕЖНЫХ НАСОСНЫХ АГРЕГАТОВ //Экономика и социум. – 2021. – №. 3-2. – С. 110-115.

51. Жураев Ш. и др. Оптимальное Размещение Тонкослойных Элементов В Горизонтальном Отстойнике Очистка Питьевой Воды //Central Asian Journal of Theoretical and Applied Science. – 2022. – Т. 3. – №. 12. – С. 53-62.

52. Akramov A. et al. Optimum placement of thin-layer elements in a horizontal sedimentation tank purification of drinking water //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2022. – Т. 1112. – №. 1. – С. 012139.

53. АСОС ДЕТАЛЛАРИНИНГ ЕЙИЛИШ МЕХАНИЗМИ ВА УНИНГ НАЗАРИЙ АСОСЛАРИ S Jo'Raev, X Ibroximjonov - Science and innovation, 2022