

REDUCE SEWAGE LIFT STATION TOTAL COST OF OWNERSHIP WITH PREMIUM EFFICIENT, SUBMERSIBLE CHOPPER PUMPS

WASTEWATER - WASTEWATER COLLECTION

The Problem

Municipalities across the country are experiencing increasing sewage lift station operating costs because of soaring planned and unplanned maintenance expenses.

Unplanned Maintenance Expenses

Any maintenance supervisor will tell you that the most common and most detestable unplanned maintenance problem that crews have to deal with is clogged sewage pumps. This problem has grown dramatically with the increased use of disposable wipes, diapers and feminine products over the past few years. According to an article published in 2015 in The New York Times (<https://www.nytimes.com/2015/03/15/nyregion/the-wet-wipes-box-says-flush-but-the-new-york-city-sewer-system-says-dont.html>), the city of New York spent more than \$18 million over the course of a five-year period on wipe-related equipment problems.

Clearing clogged pumps is not only a highly unpleasant job; it could also pose health risks for maintenance crews. For example, puncture wounds resulting from improperly disposed hypodermic needles are known to lead to hepatitis infections or other serious consequences. Additionally, clogged pumps cause secondary financial burdens as a result of backups, flooded basements, and ruined equipment.

Finding a Solution

In the past, screens and trash baskets have done an adequate job of filtering solids, when regularly cleaned by maintenance personnel. However, these modifications did not do a good job on wipes and smaller objects. Traditionally, vortex pumps have been better at handling solids than the standard two blade solids handling pump; the impeller is recessed up inside the volute away from the main channel where the solids travel through the pump. However, they are usually inefficient, averaging 30-40% efficiency at best. Consequently a pump with a vortex impeller will require twice the horsepower of a pump with a two blade impeller. The ability of vortex pumps to pass solids also means that those clogging problems are moved further down the line where they could be more costly to clear.

Many municipalities are now proactively cleaning wet pits as a method of avoiding unplanned maintenance calls to clear a clogged pump. While deep cleaning the wet pits is an effective

way to minimize clogged pumps, it still comes at a cost. Typically, deep cleaning a pit requires a crew of 2-3 working several hours, use of a vacuum truck and pressure washing both the pit and exterior of the pump. Depending on the size and difficulty, each pit cleaning could cost the municipality thousands of dollars.

Submersible chopper pumps offer municipalities a new option to solve clogging issues. A chopper pump is a solids handling pump that breaks up rags, wipes, and other stringy solids (which would otherwise cause clogging) into more manageably sized pieces that will not clog a sewage pump. Typically, a chopper pump uses a hardened impeller blade to chop waste materials against a stationary cutter blade attached to the pump inlet.

A chopper pump is used when a customer has an application with a large amount of rags, wipes, and other solids that would normally clog a standard sewage pump, resulting in significant cost and inconvenience. Typical commercial applications suited for a chopper pump include schools, hospitals, prisons, laundromats, and restaurants.



Not all Chopper pumps are created equally

Municipalities have many brands of chopper pumps from which to choose. While all will help reduce the unplanned expenses of clearing clogs, some have features that will also reduce unplanned maintenance expenses. Consider the following when choosing a chopper pump:

1. Pumps with premium efficient motors provide superior wire to water efficiencies, resulting in estimated annual energy savings of up to \$6,000 when compared to the same pump with a standard efficient motor
2. Premium efficient, Class-H oil filled motors can run up to 40°C cooler than air-cooled motors. Expensive closed-loop cooling systems are generally not required, and motor life is significantly increased.
3. Oil cooled motors continually lubricate bearings eliminating the need to regularly repack bearing grease.
4. Double row, angular contact bearings resist axial thrust from the cutting action of a chopper pump, resulting in longer pump life.
5. Larger shaft diameters reduce shaft deflection, resulting in longer life for the mechanical seals.
6. Seal leak detection in an outer oil chamber provides earlier warning of a failing seal compared to seal leak detection within the motor chamber.
7. A combination of a shaft grounding ring and oil filled motor provide the best protection against shaft voltage induced bearing failure when operating the pump with a VFD.
8. Pumps with higher service factor and starting torque will provide improved cutting action.
9. The impeller is a wear item on models that use the leading edge of the impeller to cut against the cutter bar. If the impeller is hardened and used for the cutter, it cannot be machined and will need to be replaced. Look for models that use a replaceable, hardened cutting insert to reduce impeller replacement, machining and balancing costs.
10. All Chopper pumps require proper alignment for good cutting performance. To reduce maintenance costs look for models that provide adjustments without disassembly of the wet end.
11. For longer cutting life, look for cutter designs that feature serrated cutting edges.



Summary

The increasing cost associated with clogged sewage pumps is best solved by choosing a chopper pump that embodies all eleven considerations listed in this paper. The Hydromatic HPE series of chopper pumps meets all these requirements by using premium efficiency 1.3 service factor motors, and replaceable, hardened, serrated cutters.

About the Author

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Author Biography:

Jack Bevington, a 46-year veteran of the pump industry, was the Water Systems Engineering Manager and a Development Engineer at Pentair for 41 years. He has a BSMET from Purdue. He has designed and developed numerous hydraulic pumps, from 4" well to 12" solids handling pumps; his work has resulted in 10 patents, with 2 patents pending. Additionally, Jack was a board member (1983-84) and Technical Committee Chairman (1985) of the Sump and Sewage Pump Manufacturers Association (SSPMA), and has authored an article for National Drillers Magazine (March 2000) entitled "Diagnosing Well Pump Problems".