

Slurry Pump Solutions for General Industry

Application

Grit Pumps

Slurry

Wastewater Grit Slurry

Flow Rate

200 gpm (45.5 m³/hr)

Head

28 ft (8.5 m)

Pump

Warman 3-11 SHW-R recessed impeller submersible pump

Pump Materials

High chrome iron

Motor

15 hp (11 kw) 1200 rpm

Features

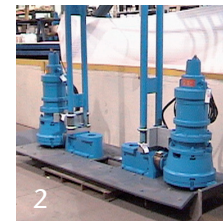
Recessed impeller, quick disconnect system with stainless steel integrated suction plate and plow



The SHW-R's proven reliability makes it the standard for grit removal in wastewater treatment.

Near the Maryland-Virginia border is the largest advanced wastewater treatment plant in the world. The plant has an average capacity of 370 million gallons per day and a peak capacity of more than 1 billion gallons per day. While other metropolitan areas have facilities with larger capacities, none of these provide the high level of treatment that this facility does with its nitrification/denitrification and filtration process. The wastewater is collected through a system that consists of 1,800 miles of sanitary and combined sewers. After collection, the wastewater then undergoes several solids treatment methods including influent pumping, fine screening and de-gritting processes.

The de-gritting process proved to be one of the biggest challenges in the wastewater treatment plant. During peak storm events, large amounts of debris, including sand and gravel, washed into the wastewater collection sewers, overwhelming an already overtaxed system. Excess grit would frequently wash into other solids treatment processes, causing downstream system failures. The original grit removal system involved using an overhead crane and clamshell bucket to remove grit



1. *Traveling Bridge system inside the Wastewater Treatment Facility*
2. *SHW-R with quick disconnect system and plow ready to leave the factory*
3. *Up-close view of the grit removed in the wastewater treatment process*

from the dewatering chambers. This system failed because of a combination of design flaws and harsh conditions. The next solution was to hire a contractor to remove the grit from out-of-service chambers. This became problematic as well. Cleaning the chambers took too much time, reducing the plant's operating capacity. Eventually, the grit chamber cleaning became continuous. Due to conflicts or cost issues, several chambers would be allowed to fill with grit before cleaning would take place, resulting in an even greater capacity reduction as they were taken off-line. The existing grit-chamber drain pumps were wearing out prematurely, adding even more cost to an already cumbersome system.

The project team selected to upgrade the grit removal system decided that before a better system could be chosen they needed to know more about the grit itself. For a year the team analyzed samples of the grit, studying the grit particle characteristics as well as variations in grit volumes and durations. The project team visited wastewater treatment plants around the world to examine how other systems handled grit. After examining the possibilities, the group came up with a travelling bridge system with submersible grit pump attached to its deck. As the bridge travels back and



forth along the chamber, the submersible pump transfers settled grit from the chamber floor into a fixed trough, where it is washed, dried, and discharged to a grit storage area.

The grit pump is usually considered the weak link in a travelling bridge system. Most failures can be attributed to clogging and insufficient redundancy or capacity. After examining several pump manufacturers' capabilities, the project group turned to Weir Minerals because of their reputation for dependable, long lasting slurry solutions. The SHW-R recessed impeller submersible slurry pump was selected as the test model. The SHW-R pump's vortex design allows any solids that pass through the pump's suction to be pumped without clogging, including stringy, fibrous, or tramp material. The heavy duty water end with high-chrome construction and proven balanced double mechanical seal design assures a long wear life and a much greater meantime before maintenance than the competition.

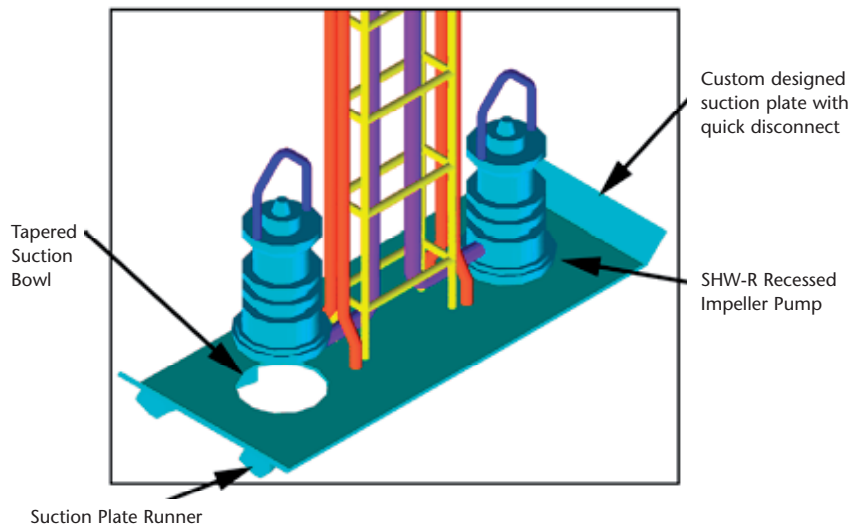
Factory testing was set up using plastic pellets with densities similar to the grit. The engineers at Weir Minerals Hazleton adjusted the pumps' suction height and arrangement to optimize the pump's ability to "lift" grit. While some pumps could pull the grit from directly below the suction, the SHW-R set itself apart by drawing the grit from a much wider area, allowing the system to capture

the majority of the grit without a build-up of solids. As a result of the testing, a custom stainless steel suction plate and plow design that helped concentrate and lift grit particles underneath the pump was developed, built, and patented by Weir Minerals Hazleton. Two SHW-R recessed impeller pumps sit atop the unit, placed into a tapered "suction bowl" that facilitates lifting of the grit. A quick disconnect system with guide rails help guide the pump into place and allow for easy installation and removal. The quick disconnect systems utilizes a special suction plate sealing ring that seals the suction head to the plow, as well as an angled discharge sealing ring that seals the pump to the discharge piping. Both seals were designed to account for any misalignment of the pumps during installation. Thirty-two of the SHW-R pumps were installed in the facility upgrade. The installation has been exposed to numerous wet weather events, and after several years the SHW-R pumps continue to run trouble free. As a result of their proven success, the SHW-R has been specified for several other Wastewater Treatment plant upgrades. Once again the Warman® SHW proves to be the most dependable, longest lasting submersible pump you can buy.

1. Warman SHW-R recessed impeller pump
2. Grit Pump Custom Suction Plate with Pump Guide Rails



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