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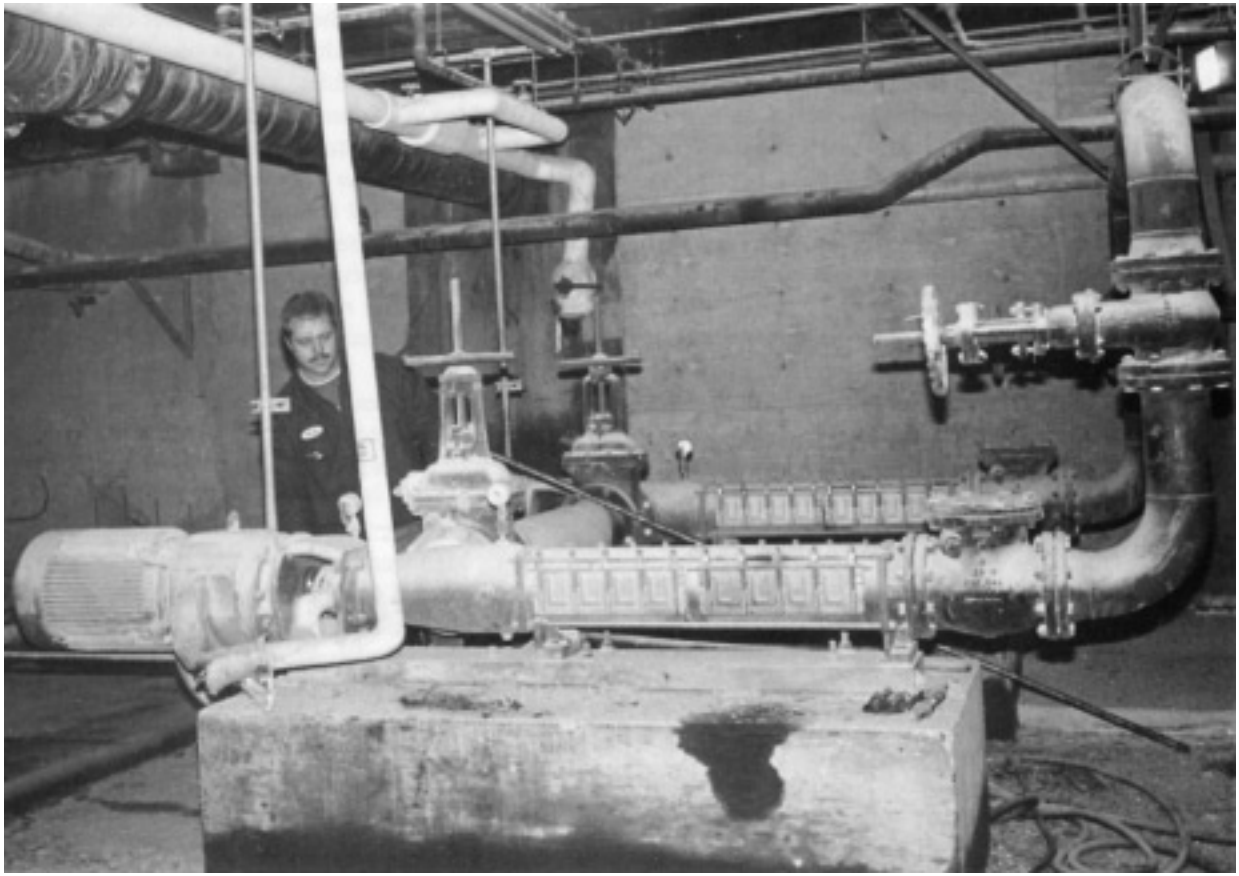
PROGRESSIVE CAVITY PUMPS FACILITATE WASTEWATER RECYCLING FOR GLASS CONTAINER MAKER

When a leading glass container manufacturer recently decided to upgrade one of its facilities, it also wanted to eliminate a major pumping problem caused during the transfer of oily, abrasive wastewater from the manufacturing plant to the wastewater treatment area. The air-operated diaphragm (AOD) pumps then in use not only cost thousands of dollars per year to maintain, but they also consumed large amounts of energy. After careful study, the company selected two new progressive cavity pumps equipped with stator retensioning devices (SRDs), which have operated maintenance-free since their installation in 1993. The plant, which produces commercial glass bottles for food and beverages, operates two regenerative furnaces with a combined capacity of about 600 tpd. The facility operates 24 hrs/day, seven days/week. During the manufacturing process, about 5%-8% of the bottles are rejected. It is in handling these hot rejects that about 95% of the facility's wastewater is generated. A continuous flow of water is used to carry the rejects into a 7200-gal. sump, where it is screened for reuse.

Additional wastewater flowing to the sump is generated from an animal fat/water mixture used during the continuous lubrication of the glass gob cutting shears and from machine oil used to lubricate the bearings, etc. of the system. The combined wastewater contains about 5% oil and glass fines.

Wastewater Treatment and Pumping Problems

In the plant, the glass maker was using three AOD pumps to transfer the wastewater from the sump to an adjacent four-level pond system, where plant management had tried various methods of



Progressive cavity pumps at glass manufacturing facility have operated maintenance-free since 1993.

separating the oil from the wastewater and recycle the cleaned water back to the plant. But the most is could achieve was 215,000 gpd, or 25%. The obsolescent pond system was also more difficult to operate during winter and unsightly, plus environmental authorities were putting pressure on the company to adopt better available wastewater treatment technology.

Tangible Results

The new wastewater treatment system and sump pumping operation now proceeds smoothly and efficiently. The oily wastewater from the manufacturing areas flows via a trench system to the sump, as before. Now, however, one of the new progressive cavity pumps transfers the water to the coalescer building at 300 gpm, one-half their rated capacity. The seepex units, installed in parallel, alternated pumping tasks every other month, so that only one is in service during processing. An automatic level control system varies pump speed to meet changing process requirements.

At the same time, the AOD pumps were experiencing problems in feeding the wastewater to the pond system. The company was operating two of them at 300 gpm, while keeping a third as a backup. The abrasive nature of the wastewater, however, was causing them to be rebuilt every two month, at a cost of $400/pump for parts and four manhours of labor at $27/hr. The energy costs of supplying air to the pumps was also costly, averaging about $6000/yr for two pumps.

New Wastewater Treatment System

After the glass producer decided to upgrade the pond system in 1993, it's engineering department drew up new plans for a new wastewater treatment system, incorporating a coalescer building with two 250 gpm oil/water separators (OWSs). They also wanted to upgrade the sump pumping operation. Engineers ruled out centrifugal pumps because they sheared the oil and water into an emulsion. The existing AOD pumps were also emulsifying the oily wastewater, but, with the old pond system, there was enough surface area and time for the oil to separate out and rise to the top before treatment. Looking for a solution to its pumping problem, the company purchased two seepex Type BN progressive cavity pumps. The BN consists of a cast iron housing, a tool steel rotor and a molded-to-size Buna N stator.

In operation, the positive displacement pump's single external helix rotor turns within a molded double internal helix stator to form cavities that create the pumping action. The pump's flow output is directly proportional to its speed, and its customized stator ensures an identical compression ratio along the entire length of the rotor/stator interface. Because the cavities do not change shape during operation, this unit is one of the lowest-shear pumps available.

In addition, the pumps are equipped with a device for readjusting stator tension. This consists of an adjustable stainless steel sleeve with an internal

rubber lining, and a series of adjusting bolts that reduce the circumference of the worn stator. In this way, the original compression force between stator and rotor can be restored, increasing the time between stator replacements. The SRD option, which cost less than half of a replacement stator, typically increases stator service life by 300% and saves the labor costs to replace a stator.

And, with the new OWSs, the company can recycle 500,000 gpd or 99% of the water back to the plant. The remaining 20,000 gpd is discharged to the sewer. Management estimates that the plant is saving 60% on sewer charges alone, enough to pay for the new building in just under two years. At the same time, the seepex pumps have operated without any major maintenance problems since their installation, eliminating the expensive repairs experienced with the AOD units.

A recent outside study on the volumetric efficiency of the new pumps showed that they had not lost any capacity, indicating that they had experienced minimal wear. It is also pointed out that the energy required to drive the new pumps is costing about $16/day, compared to $24/day for the AOD pumps. In addition, the glass company has installed the progressive cavity pumps for a similar application at one of its other facilities, and plans to use them at other plants in the near future.

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