

Third Time's A Charm

Sean Park, Central Metal Finishing Inc.

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The third time's a charm, as the saying goes. When it comes to the metal finishing industry, nowhere was this truer than at Central Metal Finishing (CMF) in North Andover, Massachusetts. Now on its third generation of pumps, CMF has finally found a solution to its wastewater treatment issues.

Founded in 1977, CMF employs 60 people and specializes in alloy processing, masking, multi-process applications, aluminum plating and stainless steel and die cast materials. The facility partners with several key customers in a variety of applications, including aerospace, industrial, commercial and military markets.

Wastewater Treatment at CMF

In a metal finishing facility, wastewater management is critical. Often, seemingly small issues can shut down the entire cycle. Providing a variety of finishes and coatings, CMF rinse waters contain nickel, zinc and other acidic metals. After these rinse waters are treated and their chemistries adjusted to a neutral pH level, CMF evaporators boil off the remaining water.

This part of the process used to create problems for many facilities. The mag-drive pumps that were traditionally used to power the evaporators were extremely susceptible to debris. Often small parts, bolts, masking, pieces of rubber or other materials find their way off the floor and into the waste treatment cycle, ruining pumps and costing facilities a lot of money. To combat this problem, many have switched to pneumatic pumps.

At CMF, we use air pumps because they're easy to rebuild, handle the abuse better and are able to pass the debris easier. Reliable pumps are absolutely essential to our productivity.

However, pneumatic pumps are not immune to damage from debris either. CMF encountered similar problems with our air-powered system. Debris from the holding tanks that was pumped out on its way to the filter press often clogged the pumps. Sputtering from debris, the pumps often required our operators to rebuild them completely, even when resistance was minimal. If there was even a little bit of back pressure forcing the pumps to work a little harder, the bottom would completely fall out. It was simply a poor design.

Like many wastewater treatment processes, after the metals settle into concentrated slurry, pumps must be able to



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push all the solids and residual brine through the filter press in order to produce the solid cake. Perhaps the biggest problem CMF encountered occurred at the end of the filter press cycle. Already on our second pump model, we had difficulty keeping the liquid chambers clear, with solids backed up all the way from the filter press to the pump. Operators had to shut the press off, clean the sludge out and restart, which often caused damage.

It seemed like every time an operator would fire up the filter press, it would bend the shafts on the pumps. We constantly had money going out the door from restarting the pumps. It became a real issue for us. Maintenance operators had to completely disassemble the pumps and clean them out. Sometimes more than one pump was down at a time, or I had to wait for parts, which created a backlog of work. Operators had to come in on Saturdays and Sundays to get the processes caught up.

I met with David Carson, the director of industrial sales for Burt Process Equipment (Hamden, CT), and explained our situation. Carson offered to loan CMF a 2-in non-metallic Ingersoll Rand ARO EXPert™ diaphragm pump to use in place of our current pump for 60 days. Tired of rotating failing



CMF trialed this 2-in non-metallic diaphragm pump as a loaner for 60 days. Because it withstood a tremendous amount of abuse without a single issue, the facility kept it.

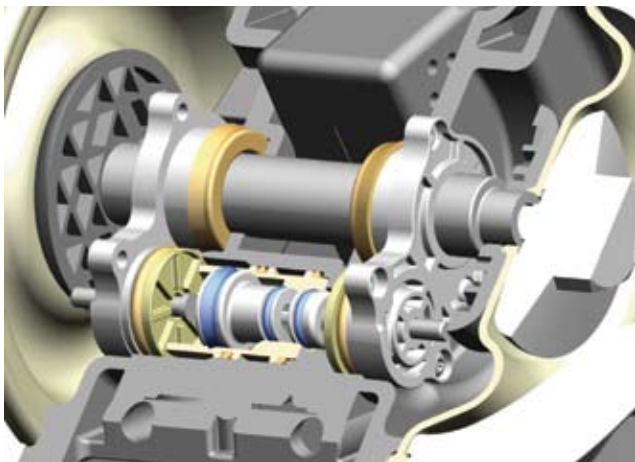
pumps in and out, I decided to try it.

The pump withstood a tremendous amount of abuse, without a single issue. It worked well enough that our general manager didn't even want to purchase a new one, so we just kept the loaner.

Common Design Flaws

The problems CMF experienced are typical in wastewater treatment applications. Often, pumps do not produce a high enough flow rate to turn the slurry into a solid cake, creating problems on the line and in packaging. Typically, fluid caps are the culprits. Pumps with larger cavities in their fluid caps create better flow rates from lower air pressure.

Additionally, many non-metallic pump manufacturers utilize a ribbed design on fluid caps. Originally intended to provide greater strength, the ribs actually function as stress points that weaken the caps, compromising structural integrity and decreasing pumping capacity. Poor pump designs also create air "blow-by," another costly problem that decreases flow rate. Blow-by occurs when a positive seal is not achieved as the valve



The new pump CMF installed uses an unbalanced valve design to eliminate valve centering and pump stall-out, even under low air inlet pressures.

is shifting, creating lost air pressure and a decrease in energy efficiency.

"This new pump utilizes a positive seal on the valve spool created by 'U-cups' to ensure maximum efficiency," explains Carson. "The simple but rugged design almost completely avoids air blow-by."

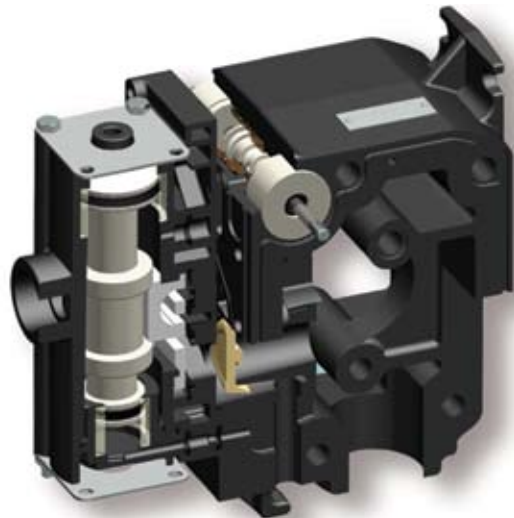
Pumps also stall frequently in wastewater applications because of poor motor technology. Many pumps feature a "balanced" air valve design that allows the valve to center under low air inlet pressures, preventing a complete positive shift and stalling the pump. In filter press applications where pressure is constantly increasing, a "straight-spool" design often spells pump trouble.

Freezing is another chronic problem in wastewater applications, causing the motor to seize up and fail. Compressed air turns extremely cold as it returns to atmospheric pressure, allowing moisture with the air supply to freeze. These ice particles accumulate, clog the exhaust port and stall the pump. To combat this problem, many facilities implement space heaters, hot water taps and other thawing mechanisms.

"A Quick Dump™ feature on this new pump removes wet, cold air and sends it through the exhaust," says Carson. "Operators don't need extra equipment to thaw the motor, because it takes care of itself."

The new pump has helped CMF dramatically increase our productivity. It has been in use for two years now without repair.

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