

How One Large Chemical Supplier Uses Sealless Nonmetallic Pumps to Lower Costs, Improve Safety—and Increase Output

By Adam Cornford

ChemTreat, Inc. is one of the world's largest suppliers of acid- and caustic-based industrial water treatment products. ChemTreat custom-blends raw materials to meet the unique needs of customers across a wide array of industries, including chemical, food and beverage, automotive, and fuel processing—more than 55 specific blends. Hence ChemTreat's manufacturing processes are designed to address the specific requirements of one order at a time. No single manufacturing approach or blend of chemicals applies across the board—in fact, both blends and production processes vary widely.

One consequence is that the pumps that facilitate these processes must be quickly removed, reset, and reinstalled each time a blend order is completed, and a new order is queued up. ChemTreat had been able to manage these pump resets and maintain fast turnaround for its customers through years of steady growth. But this growth, which led to an unprecedented number of new orders, also meant that pump failures increased along with production volume and variety. Pumps were breaking down more often, endangering the company's well-deserved reputation for order turnaround within three to four days and raising maintenance and replacement costs.

It became increasingly clear that the types of pumps the company had been using were no longer adequate. Management at ChemTreat began the search for a pump that would meet the needs created by the company's success while continuing to deliver finished products at its established service levels. They tested the options available on the market against such criteria as chemical compatibilities, flow rate, reliability, and manufacturers' turnaround times (since even the best pumps may have to be replaced at short notice).

Needed: A Tough Pump for Caustic Corrosive Fluids

Most of ChemTreat's blends are at the extreme ends of the pH range—ultra-acidic or ultra-caustic. Chemicals at both ends are highly corrosive, so that containment is always an issue. In conventional centrifugal pumps, the shaft from the external motor must enter the pump, passing through the pressure-retaining casing, to drive the impeller. This aperture must be properly sealed to prevent any of the fluid escaping. In the case of the highly corrosive blends that make up much of ChemTreat's stock in

trade, any leakage not only lowers gallons-per-minute throughput but may corrode the outside of the casing and, if in any significant quantity, possibly also endanger plant personnel. In practice, even the best seals corrode under ultra-caustic or ultra-acidic conditions, triggering pump shut-downs and requiring the installation of replacement seals. The pump chamber must also be corrosion-resistant; today, this is typically accomplished by using PTFE to line the metal casing or to sheathe the impeller—PTFE is not robust enough to form a chamber or an impeller on its own.

Magnetic Pumps—No Seal Required

Magnetic pumps are an effective solution to this problem. The external motor spins a ring of powerful electromagnets around the impeller, which contains a corresponding set of permanent magnets. The motor shaft does not need to enter the pump chamber, which means that no seal is required, and the leakage problem is eliminated. Because magnetic force diminishes according to the inverse square law, though, the motor magnets and the corresponding impeller magnets must be extremely close to one another for the pump to operate effectively. Most magnetic pump impellers are PTFE-coated metal, like the chamber itself. The thicker the PTFE coating, the more wattage must be used to power the motor. Moreover, the rotation of the impeller generates electric force, which can cause thermal eddy currents to flow through the metal and lead to corrosion within the system.

With these concerns in mind along with the others, ChemTreat settled on the Fybroc® Series 2530 close-coupled sealless magnetic-drive pump from CECO Environmental Specialty Pumps. The Fybroc 2530 pump is a solid, one-piece molded thermoset unit, which features no welded, sealed, or lined parts. The Fybroc pump leverages a proprietary Resin Transfer Molding (RTM) process to match metal's strength and capabilities due to the controlled placement of long-strand fiberglass reinforcement in high-stress areas. The result is solid, homogeneous components with excellent physical properties and strength-to-weight relationships equivalent to those of metal parts. Crucially, the pump delivers optimum corrosion resistance and exceptional chemical compatibility. Simply put, the Fybroc 2530 does not corrode—inside or out. This allows it to handle the highly caustic and highly acidic raw materials ChemTreat uses in its manufacturing processes without difficulty. Together with temperature thresholds and robust solids-handling capabilities, these properties make the Fybroc 2530 exceptionally reliable, eliminating much of the unplanned maintenance required by ChemTreat's previous pumps. Moreover, the Fybroc 2530 has helped increase plant safety and address compliance mandates by ensuring negligible or zero fugitive emissions from the pumping equipment.

CECO Fybroc 2530 Pumps Deliver for ChemTreat

Because the majority of ChemTreat's orders are processed batch by batch, it is very easy to predict when a particular pump will need to be replaced. For this reason, ChemTreat especially appreciates CECO Environmental's ability to quickly deliver new Fybroc 2530 pumps as needed. Because the pumps are available on demand, plant managers are able to order a new pump, install it, and move forward with the next order, all without having to keep upwards of \$100,000-worth of spare pumps on the shelf.

In the ten years since ChemTreat installed its first Fybroc 2530, ChemTreat management has been consistently impressed by how well these pumps can stand up to the rigors of the company's manufacturing processes. They rarely require service — a major change from ChemTreat's previous pumps, which toward the end of their lifespans would unexpectedly fail several times a week. The Fybroc 2530s have also allowed ChemTreat to limit the number of hours company technicians must spend doing scheduled preventative maintenance. This enables ChemTreat to fill a higher volume of orders between repairs.

Together, these factors have helped ChemTreat reduce its manufacturing downtime by more than 80 percent. And as the frequency of both planned and unplanned interruptions has dropped, the company has seen a significant rise in productivity, which has translated to more orders completed at a faster rate. Less downtime and fewer hours required for preventative maintenance, along with productivity gains and newfound ability to process a higher volume of customer orders, allowed ChemTreat to recoup its investment in Fybroc 2530 pumps a short eight months after they were first installed. More information can be found on <https://www.cecoenviro.com/fybroc>.