ChemTreat®

FlexPro®

Flexible Control, Exceptional Protection, Maximum Efficiency

FlexPro® is a high-performance technology for cooling systems

- Wide range of products for corrosive, scaling, and reclaim waters
- Excellent corrosion protection[1]: persistent passivation, non-fouling, multi-metal inhibition
- Exceptional fouling/scaling control with non-phosphorus antiscalants when required
- Phosphorus-free[2] and zinc-free product characteristics to help customers meet environmental sustainability goals
- Significant reduction in oxidizing biocide consumption in some cases
- Fluorescent-traced for automatic feed and control and proprietary PolyTrak® method for measuring active polymer
- Proven technology: nine years of application experience; more than 1,000 unique applications spanning refining, chemical/petrochemical, steel, aluminum, power, fertilizer, C&I, and other industries
- Five global patents, 16 conference presentations, five journal articles

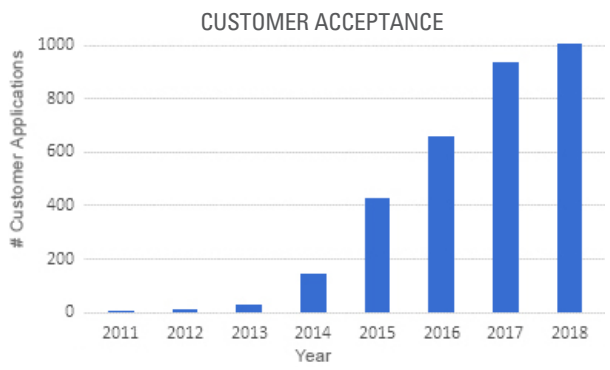
Why FlexPro®?

When the water treatment industry was encouraged to eliminate chromates over 35 years ago, phosphate- and zinc-based treatment programs emerged as the technology of choice, but the industry has become increasingly aware of some challenges that can be associated with phosphate-based technology:

- Precise control required to prevent phosphate deposits on hot bundles
- Escalating dispersant demand to prevent phosphate precipitation
- Phosphate's contribution to toxic algae blooms, including the hypoxic or "dead" zone in the Gulf of Mexico

These complexities, along with emerging environmental restrictions on phosphorus discharge, prompted ChemTreat to launch a multi-year effort to develop a technology that alleviates these challenges. The result is **FlexPro®**: a high-performance, sustainable phosphorus- and zinc-free approach to cooling water treatment.[2]

Since the launch, more and more of our customers have been adopting FlexPro® technology to take advantage of its superior corrosion inhibition/passivation, non-fouling concepts, and environmental benefits.

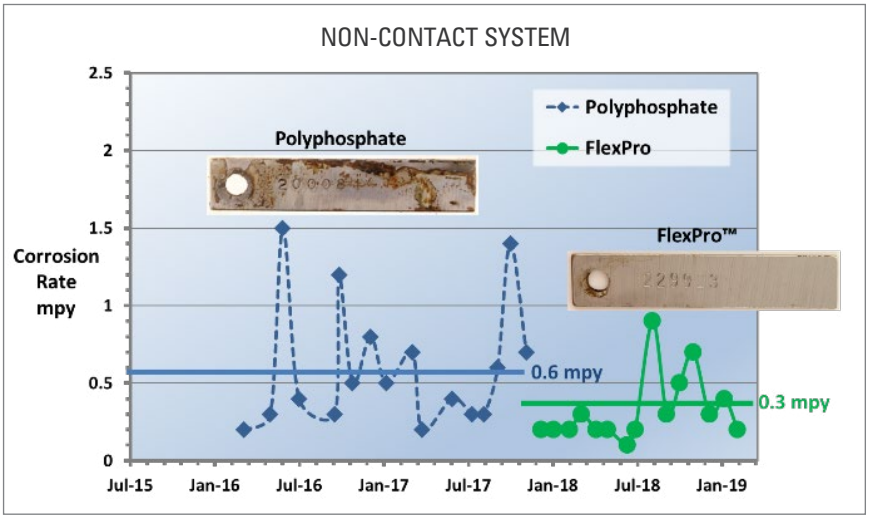


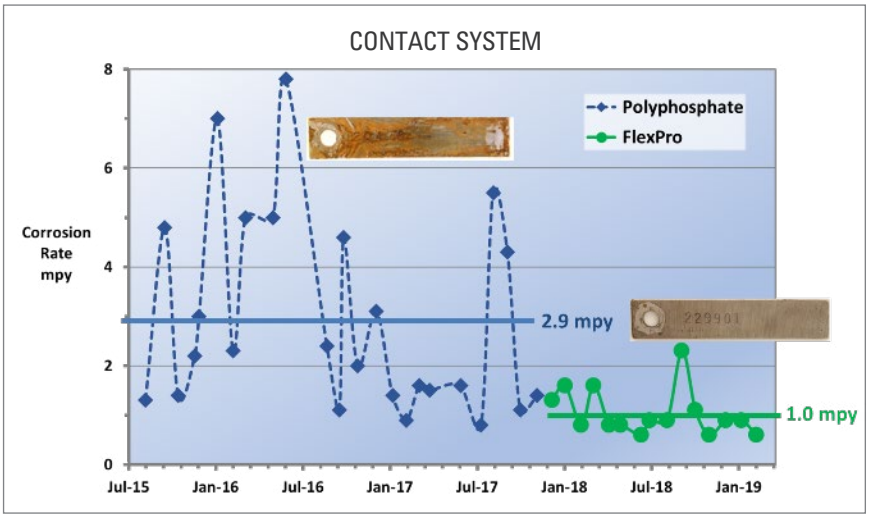
[1] *Compared to phosphorus- and zinc-based programs*

[2] *The FlexPro® corrosion inhibitor is phosphorus-free. Some FlexPro® products are designed to contain low levels of phosphorus.*

Resolving Deposition Issues at a Steel Mill

Cooling water is a critical, challenging-to-treat component in the steel industry. A large steel mill started using FlexPro® after experiencing high heat transfer deposition issues from their phosphate cooling tower treatment program. After making the switch, not only were the corrosion rates reduced in their non-contact system, but the fouling problems were eliminated.





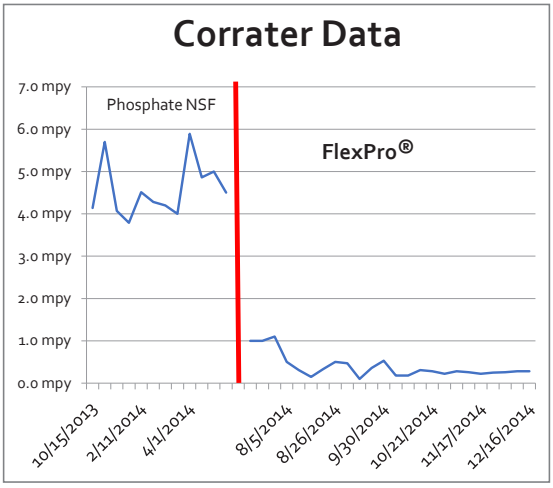
Benefits of successful FlexPro® application included:

- Phosphorus addition reduced to zero
  - ⇨ 171,000 pounds per year of phosphate as PO_4 eliminated
- 37% reduction in cooling tower discharge (75M gallons per year)
- Substantial reduction in corrosion
  - ⇨ 30% reduction in non-contact water
  - ⇨ 65% reduction in contact water
  - ⇨ > 90% reduction in service water
- Expected to increase work roll life based on superior corrosion performance

Reducing Corrosion and Deposition in a Hydrostatic Cooker

A food plant hydrostatic cooker was treated with a phosphate NSF-based program, which struggled to treat deposition and corrosion.

ChemTreat recommended FlexPro® technology, which greatly reduced deposits and brought the corrosion down to <0.5 mpy.



16 Stork - Corrator Tips 05/20/14

Treated with phosphate NSF in system for 60 days; tips show corrosion and deposition

16 Stork - Corrator Tips 01/20/15

Treated with FlexPro® in system for 180 days; tips show minimal corrosion and deposition

FlexPro®

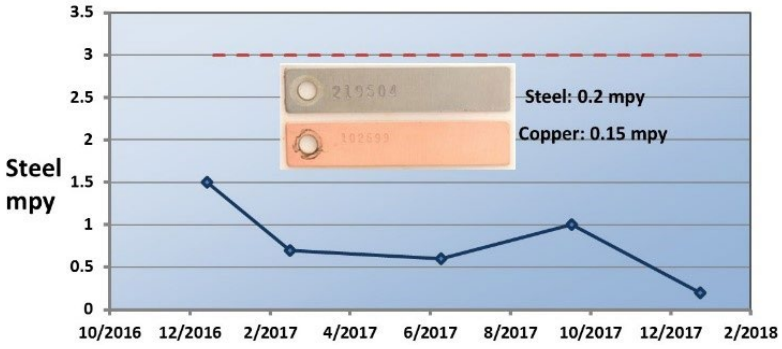
Results will vary based on individual circumstances. ChemTreat cannot guarantee results.

Sustainable & High-Performance Treatment Program at a Gulf Coast Refinery

A gulf coast refinery was using a phosphate-based corrosion inhibitor program. Because of the scaling issues on the very hot heat exchangers and impending environmental concerns (potential creation of hypoxic zones in the Gulf), the plant wanted to move away from phosphate-based programs.

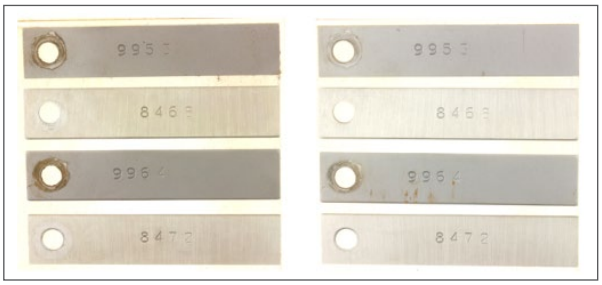
ChemTreat implemented non-phosphorus FlexPro® technology, and, since then, both mild steel and copper corrosion rates have been excellent. Additionally, the bulk water iron is down to 0.05 ppm. These results exceed industry standards for such highly challenging waters.

Since implementing FlexPro®, the performance of the heat exchanger equipment has also improved.



Calcium Phosphate Deposit Fouling Control

In another example at a large chemical plant on the Gulf Coast, calcium phosphate deposits caused fouling in some of the plant's plate-and-frame heat exchangers. Conversion to FlexPro® chemistry improved corrosion protection and eliminated phosphate deposition, resulting in savings of approximately $175,000 per year in plate and frame heat exchanger cleanings. Surface condensers were also opened up clean, free of scale and corrosion products, with no loss of vacuum observed.



Corrosion coupons downstream of the heat exchanger show results before and after cleaning.

FlexPro®

With over 9 years of experience and more than 1,000 unique applications, FlexPro® has demonstrated the following benefits compared to phosphate- and zinc-based programs:

- Increased cooling water system reliability
- Improved biological control
- Improved environmental compliance
- Improved corrosion inhibition
- Water reuse
- Simplified startup and passivation

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