

Cooling Tower Case Study

March 30, 2017



LEED Gold Headquarters Building
Houston, Texas
1,000 Ton Cooling Tower

Key Success Factors

- Prevent scale and biofoul accumulation in tower and chiller
- Reduce water consumption
- Optimize chemical program effectiveness
- Extend service life of infrastructure, fill and piping
- Reduce energy costs
- Reduce maintenance expenses

Results

- All key success factors were met during the 90-day demonstration
- Cycles of Concentration doubled without scale accumulation while chemical use was reduced by 90%, resulting in over 50% water savings
- Projected payback period aligns with the customer's expectations

Electronic Water Conditioning Allows for Substantial Savings in Commercial Building



A Fortune 100 headquarters, located in Houston, TX was certified LEED Gold in 2008. While continued efforts have been made each year to improve energy and water efficiencies, the company still identified the need for its cooling system to improve water conservation, as well as energy savings and chemicals reduction. *HydroFLOW* electronic water conditioning was the recommended solution for achieving these additional savings. *HydroTech Solutions*, the *HydroFLOW* distributor in Texas and Oklahoma, provided a 90-day demonstration, beginning April 26, 2016. In December 2016, a Total Management Program was implemented.

About the Cooling Tower

The headquarters campus features two buildings, each with a 1,000 ton cooling tower situated on the rooftop. The cooling towers exhibited scale buildup on infrastructure, fill, and piping. The chiller units are opened for cleaning and inspection annually, with scale accumulation at entry sections and rifling that required cleaning. Three cycles of concentration were allowed with conductivity set-point of 1,500 μS for blowdown. Despite a diligent chemicals management program for the control of scale, bacteria and corrosion; the cooling towers continued to exhibit accumulated scale and biofouling.

The *HydroFLOW* Solution

A 12" Custom *HydroFLOW* unit was installed inside the building, on the return line from the chiller. No pipes were drilled or cut, and the circulation of the cooling tower water was not interrupted during the installation. As a part of the baseline data gathering process, the several surfaces were cleaned of scale to bare metal. The purpose was to prove *HydroFLOW* prevents new scale from forming. Additional baseline data which was collected included make-up water volume, sanitary sewer disposal volume, total bacteria in the water, chemical costs and maintenance related expenses.

The purpose of collecting the baseline data came to demonstrate the cost savings associated with *HydroFLOW* electronic water conditioning.

Implementation Procedure

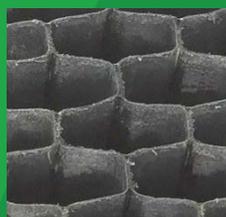
Metering devices and sensors with 24/7 cloud based monitoring were installed on the cooling towers to evaluate feedwater, circulating and blowdown conditions. Conductivity based blowdown set-points were established for consistency.

Initially, Chemicals were gradually reduced over a span on 4 weeks. Once it was confirmed scale and biofouling control could be achieved with a combination of *HydroFLOW* and minimal chemical usage, blowdown was reduced and cycles of concentration increased.

Pictures of Chiller Tubes



Pictures of Fill Media



Before

After



90 days into the demonstration, deposits inside the tubes and on the fill media did not increase after chemicals were reduced and the water concentration cycles were increased. Hard scale deposits began to soften and could be removed easily.

“HydroFLOW significantly improved the operation of our cooling system, in terms of cost and maintenance. This technology pays for itself with the monthly savings it attains.”

Headquarters Facilities Manager

Results

The HydroFLOW Total Water Management Program is a complete success. The results are illustrated in the table below:

	U/M	Feedwater	Circulating	Circulating	Circulating
Sample Date		3/30/17	4/25/16	2/15/17	3/30/17
Temperature	°F	72	65	67	75
pH		8.55	8.50	9.37	9.65
Cond	μS/cm	512	1,535	3,560	3,577.00
Alkalinity	ppm	210	125	145	750
Calcium	ppm	200	108	180	300
LSI		1.20	0.50	1.70	2.90
COC			<3	Zero BD	Zero BD

In March 2017, after almost one year of operation, the following benefits have been achieved:

- Cycles of Concentration has been increased despite a higher LSI for the recirculating water.
- Although total make-up for March was 191,000 gallons, blowdown was zero, resulting in lower water consumption.
- pH has been increased resulting in improved corrosion control.
- Chiller efficiency has increased by 2%-3%, resulting in reduced energy consumption.
- When the chiller was opened for its latest regular cleaning, the tubes were clear of scale, resulting in lower maintenance costs.
- The tower fill is scale-free, resulting in lengthened useful life.
- Chemical consumption has been reduced by 90%.



About HydroFLOW

HydroFLOW devices, which are powered by Hydropath technology, apply a frequency that travels throughout the water system and causes dissolved minerals to cluster in the water thus preventing hard scale from forming on pipes and equipment. The ±150 kHz frequency also disrupts biofilm and bacteria, which minimizes biological loading in a recirculating water system, such as a cooling tower.

HydroFLOW is installed on the outside of a pipe of any material (plastic, metal, etc.) without cutting or modifications.

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