CASE STUDY
CH-1983

# Nalco Water HEAT Program Optimizes Heat Exchanger Maintenance Costs And Improves Reliability In Petrochemical Plant

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## INTRODUCTION

Cooling water heat exchanger performance can have significant impacts to the overall throughput, safety and reliability of an operating unit as well as total maintenance budget. Often, the cooling water heat exchangers are not monitored as closely as other critical equipment in the field, due to lack of readily available data. Planning for turnarounds and predicting heat exchanger maintenance such as cleanings or retubing can be a difficult exercise when there is not ample performance data.

## BACKGROUND

A North America petrochemical plant routinely cleaned a large number of cooling water exchangers as part of their normal maintenance practice. The cleanings were performed in the spring in preparation for higher production rates and increased cooling water supply temperatures in the summer. The goal of the operations team was to continuously run production safely throughout the year; however, there were no metrics or performance data available to make precise heat exchanger evaluations. As a result, the heat exchangers were selected based on production schedules and process needs. The maintenance planning group also reviewed the cleaning list, but without sufficient data to determine whether an exchanger needed to be cleaned, numerous exchangers were cleaned unnecessarily. Maintenance costs climbed due to the rate of roughly $25K per cleaning.

## SOLUTION

Nalco Water worked closely with the customer's operations team to implement Nalco Water HEAT, a digitally enabled heat exchanger reliability management program. The goal was to optimize the total costs of operation. A dedicated team of technicians and engineering consultants conducted a comprehensive cooling system audit. Holistic MOC data and inspection reports were collected and processed using the HEAT digital platform, which then provided guidance on exchanger operations and cleanings, turnaround planning and water chemistry.

Through turnaround inspections, the team discovered that 95% of heat exchanger issues were due to chip scale, proving that certain heat exchangers did suffer from low water velocity and high skin temperature. Nalco Water also completed a comprehensive cooling system review with the customer's operations team.

**ANNUAL SAVINGS**

**COSTS**

Decreased cleaning costs by
**$600K**
per year

**VALUE DELIVERED**

Reduced annual heat exchanger cleaning by
**80%**

Based on these findings, the following actions were taken to rectify the situation:

1. Began Nalco Water HEAT as a routine service to monitor heat exchanger performance

2. Upgraded to High Charged Polymer to eliminate mineral scaling issue

3. Implemented plant wide backwashing program for all capable heat exchangers. Monthly backwash was scheduled for all exchangers, and some critical exchangers were backwashed weekly.

4. Changed operation on some units to reduce stress or eliminate throttling of the inlet cooling water.

These changes and new processes allowed Nalco Water and the customer to proactively improve heat exchanger reliability and enabled them to rectify performance declines on time and optimize maintenance operations.

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## RESULTS

The customer reliability department kept historical maintenance records for 67 exchangers. More than half were slated to be cleaned annually as a preventative measure, regardless if they were clean. Following the implementation of Nalco Water HEAT, comprehensive performance information was collected which provided data driven decisions on which heat exchangers should be cleaned.

As a result of the upgraded High Charge Polymer and improved heat exchanger monitoring, Nalco Water was able to remove unnecessary cleanings from the spring-cleaning list.

By year five, total heat exchangers cleaned per year were reduced from 35 to 7 while maintaining unit performance and reliability. This comes down to an 80% reduction in cleaning costs which translates into approximately $600,000 USD in cleaning costs savings per year (Figures 1 and 2).

Note: The $600K only represents the physical cleaning cost savings.

## CONCLUSION

Nalco Water HEAT is a proven platform for heat exchanger reliability management. With regular monitoring of key heat exchangers, HEAT provided guidance on water chemistry optimization and turnaround planning activities including online cleaning and retubing exchangers. Nalco Water successfully partnered with the petrochemical plant to drive a safe and sustainable heat exchanger reliability management program, optimize maintenance costs and improve reliability.

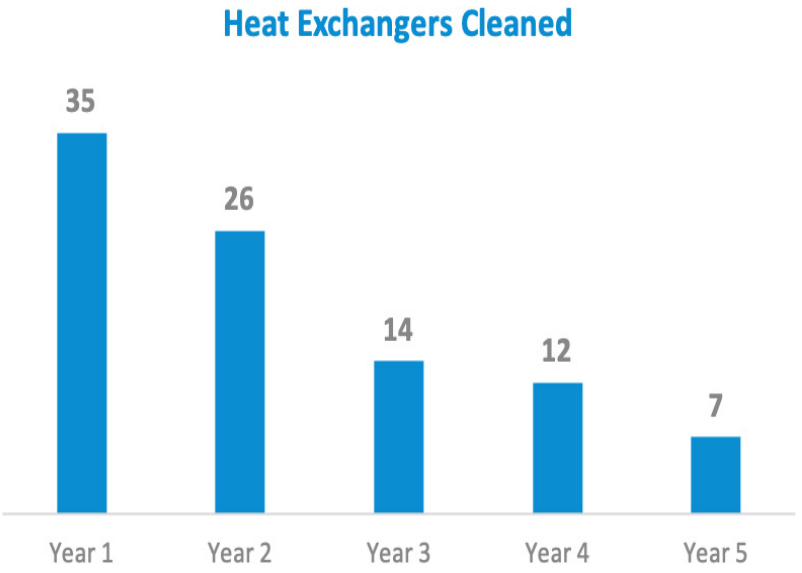


**FIGURE 1**: NUMBER OF COOLING WATER HEAT EXCHANGERS CLEANED PER YEAR

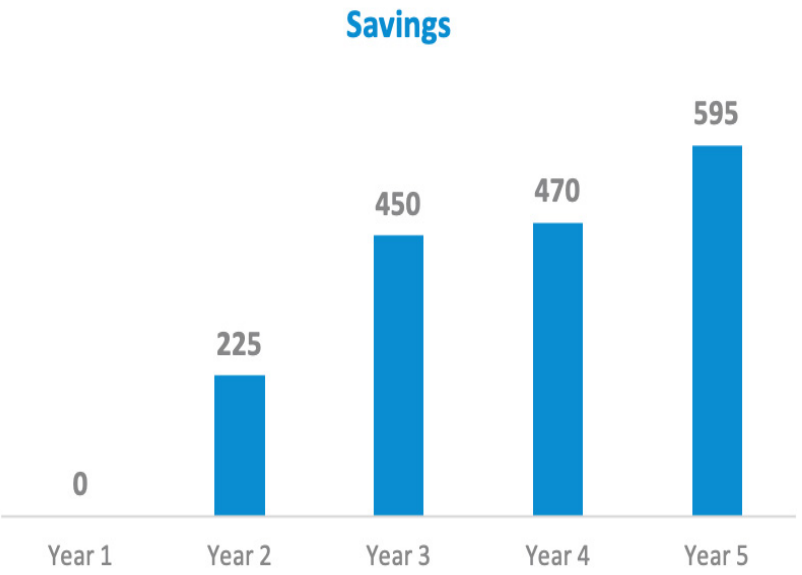


**FIGURE 2**: TOTAL SAVINGS ACHIEVED (IN THOUSANDS OF U.S. DOLLARS)

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